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Agriculture.

CO-OPERATION FOR FARMERS.

Some years ago, at an agricultural conference held at Warwick, Mr. C. P. Mau read a paper on "Co-operation and how to make use of it." It may be well to consider his arguments in favour of co-operation in these times of high prices for food, machinery, stock, &c.—the result of the war and of the high wages demanded by workers in all branches of industry, rural and urban. Mr. Mau said:—

"Co-operation is the uniting together of a number of individuals for the purpose of obtaining food or other supplies at the cheapest rates. There are several uses to which co-operation may be applied, namely:—1st, for the purpose of distribution; 2nd, for a number of men to buy from the middleman; 3rd, to buy directly from the factory or wholesale houses. Most people do not realise these principles unless they have a fall-out with their storekeeper. Now, in my opinion, that is wrong. Co-operation should be used particularly amongst small farmers, to enable them to get their supplies as cheaply—that is, at the same rate—as the large estate holders who are able to buy at wholesale prices.

"Or take the middleman, for instance. What does he do? He buys wholesale for the simple reason that he can get his goods cheap. Therefore, when farmers from year to year notice how the big estates and tradesmen buy wholesale, should they not co-operate to follow their example rather than raise a cry out against the fat man as usual?

"We must take a pattern from him how to do the business.

"I will refer you to the three methods before mentioned:—

"First.—To start without a fixed capital we should organise as strong a body of farmers as possible. They must, in fact, all and each one, form a group to buy their supplies at one place. Tenders must be called for periodically to get quotations. Then it is as plain as daylight that the small farmers will be able to buy at wholesale prices as well as the tradesman. In fact, it strikes me that the co-operative farmers might get a tradesman to quote goods as cheaply as if they appointed their own agent to buy.

"Second.—The group of farmers united together as above should register themselves as a limited liability company for the purpose of buying their own stores, and subscribe among themselves sufficient to buy, say, one month's supply. Suppose the group to consist of fifty members, and that each member, on an average, would require £5 worth of goods for the month. This would amount to a total expenditure of £250 on the first order. At this stage it will be necessary to appoint from amongst the group, if possible, a reliable business man to act as buyer and salesman for the company, and to him must be handed over the sum subscribed to buy goods wherever he best can in the cheapest market. The goods, on delivery, must be kept together in a warehouse or a shed, and thence distributed to the members of the society when needed. A strict account must be kept of the goods delivered to members, and the amount of their value must be handed to the salesman to keep his stock of goods up to the same standard as at the beginning. New members can join at any time, when approved of by the company, by handing to the salesman the sum of money required to buy the goods they are in need of.

"It goes without saying that the more members the greater the success. I wish to point out that a co-operative company on the above lines cannot fail, because we should not be dependent on customers. We buy our own goods and make our own profits, and each member will get his or her share of the profit proportionate to the money they had spent by getting their goods at wholesale prices. I will remark that no one is able to undersell a company established on the above lines, for this reason: If our salesman discovers that a firm is quoting below his company he can at once go and buy from that firm, and so be able to compete favourably.

"Should the business of the company increase to such an extent that the members should deem it advisable to start business with the public, nothing is simpler than to merge the contributions of members into a working capital, one share being given for each £1 subscribed standing to his or her credit.

"Then a co-operative store can be run on similar lines to others.

"I feel sure that my first, second, and third methods will do to work upon at first—to commence the system and to work it up thoroughly before launching out into a public co-operative association. We must

remember that to start a co-operative company requires large capital, which is not easy to get together for a lot of hard-struggling farmers. So it is well not to try to walk before we can creep—a man must be a boy before he becomes a man. Therefore, even 100 poor farmers will not make a capitalist. Hence, oftentimes co-operation goes down to ridicule, and is sneered at by its opponents.

"In conclusion, I will point out that agency companies established all over the State on the above method will enable the producer to be brought into direct contact with the consumer, and thereby get full value for his product. At the same time the consumer will get full value for his money. The system in vogue at present of letting all goods go through three or four agents, and finally the storekeeper, is what makes the small farmers suffer both in the North and South.

"Southern farmers produce everything in the way of produce that the Northern canegrower is in want of. I ask, in the name of the farmers I represent, shall we farmers South and North not make up our minds at last and put our shoulders to the wheel to do our business on the lines I have at least tried to explain to you for the good of the farmers? By doing so we shall make the farmers both North and South greatly better their condition, each being able to buy his requirements more cheaply and sell his produce at a better price; the latter, because the agency and other profits have not to come between the buyer and the seller. I can speak from personal experience of the benefits of co-operative buying on a small scale. Let us endeavour to apply throughout the length and breadth of Queensland a principle which is capable of bringing many benefits to our door, and eliminating a growing evil in trade which is filling our cities, depleting our farming districts, and adding nothing to the wealth or welfare of the State."

We might emphasise Mr. Mau's proposals by asking: If the Military, Naval, and Civil Services can support large stores that supply their members all over the country with "cheap" articles, why cannot farmers organise and support a movement which will benefit them in a similar manner? Why should they not join hands and pay a moderate annual subscription to an organisation of their own, and thus be able to purchase all their supplies on special terms through the duly-appointed trade agents of the society?

No capital to set up store-keeping would be required, as good terms could be made with agents.

In connection with co-operation and dairying, Mr. R. R. Kerr, Dairy Supervisor, Victoria, writes as follows in the "Journal of Agriculture" (10th May) on—

"CO-OPERATIVE OWNERSHIP OF BULLS.

"Of the many useful ways that co-operation could benefit the farmer, nothing would be more important than the principle applied to the buying and use of dairy sires. In all closer settlement dairying areas

the herds are on the small side, numbering 10, 12, or 20 odd cows. The keeping of a sire for so few a number of cows is not the best business arrangement, putting the farmer to unnecessary cost both in the buying and keeping of the bull.

"These small farms are generally handy one to the other. Can any strong argument be raised against one farmer caring for the bull and the neighbours bringing their cows across for service? Surely the neighbourly spirit is existing to that extent. The system advocated would be for three or four farmers to combine or co-operate and buy a good animal, and arrange between themselves as to whether one of the number should be paid for keeping the bull or whether each should care for him in turn. The price of a good sire from a tested dam with a 400-lb. fat record, although a splendid investment, has one deterrent in that it is an outlay of cash that the small farmer can ill afford, because he has to wait three years to get the benefit of his investment. One bull judiciously used can serve at least 50 cows. If £30 or £40 were divided between three or four farmers, the share of each would be £10—the price of the mongrel sire now so prominent. Were such a scheme adopted, its benefits would be manifold.

"The resultant progeny would have a much higher market value, and the returns from the increased yields would many times pay for the original investment.

"The improvement of herd yields is of national importance, considering the wealth of the dairying industry; and to the mind of the writer the selection of dairy sires is of equal importance to the industry as the certification of stallions to the horse breeders.

"Bulls from dams yielding 400 lb. fat are being slaughtered simply because dairymen do not know their value and refuse to give the few extra pounds asked for them. They are content to plod along using the mongrel sire, or, nearly as bad, the pure sire from a worthless dam, raising useless stock—living monuments to such limited intelligence. The purebred sire will always demonstrate his right to be called the foundation of the dairy industry.

"Too many who start in the business of breeding purebred animals become discouraged, because they do not reap handsome profits during the first two or three years. It is often a long journey from beginning in the breeding of purebred live stock to the position of a leader whose produce is in demand at high prices. Ten years is but a short time when it comes to establishing and making known a reputation as a real constructive and honest breeder, no matter in what line one may be engaged. Twenty years or more is often required to attain the fullness of confidence and recognition on the part of buyers of pure stock. It takes years to build up the good-will that goes with profit-making in any business where public confidence is an asset, and the breeding of live stock is no exception. If you feel that you have made a wise choice in the line of breeding you have selected, stay by your chosen breed. It will pay in the end. The in-and-out policy is neither constructive nor profitable."

THE VALUE OF POTASH IN AGRICULTURE.

In March, 1917, at the fourteenth ordinary meeting of the Royal Society of Arts, London, Dr. J. A. Voelcker, Ph.D., F.I.C., read a most interesting paper on "Fertilisers and their Supply in War Time." He dealt mainly with the points at issue, such as—What are the present conditions of supply, what are the needs, and how can these be best provided for?

"The most common of all fertilisers," he said, "is, of course, farmyard manure, comprising in itself the three constituents—phosphoric acid, nitrogen, and potash. The supply of it is, however, a regularly decreasing one, and the great rise in the price of feeding stuffs experienced since the war began made it increasingly expensive to produce. As a consequence, dependence will more and more have to be placed on artificial fertilisers.

"PHOSPHORIC ACID.

"Fertilisers that mainly supply phosphoric acid are superphosphate, basic slag, and ground phosphates.

"NITROGEN.

"Of two sources of nitrogen—nitrate of soda and sulphate of ammonia—the former is, to all intents, no longer available for agricultural purposes. Added to the difficulties of shipment—it all coming from the west coast of South America—is the fact that it is all required in connection with the manufacture of explosives, either directly or for making the all-essential nitric acid. When procurable at all, its price is £21 to £22 per ton, which, compared with sulphate of ammonia, now at £16 per ton, and containing one-third more nitrogen per ton, puts it 'out of court.' As between the two sources of nitrogen, it may be said generally that, though nitrate of soda was perhaps the favourite one with farmers, they will suffer little or nothing by the change. The superiority of one or the other is mainly a matter of season and price, and, to some lesser degree, of the land and the crop. Sulphate of ammonia is a few days slower in its action, but is preferable on clay land, just as nitrate of soda is to be chosen for chalk soils. Sulphate of ammonia is less readily washed out, and so does better in a wet season, and nitrate of soda in a dry. For potatoes and sugar-cane, sulphate of ammonia is to be preferred; for a hay crop, nitrate of soda. But the differences between their action are not such as to interpose any real difficulty now that only sulphate of ammonia is obtainable.

"POTASH.

"Lastly comes the consideration of potash-supplying materials, and these need not detain us long, for it is well known that, since the products of the Stassfurt mines ceased to come here, agriculturists have practically had to do without potash. Much has been said and written about the providing of a substitute for these salts; but, though seaweed, the ashes of hedge-clippings, bracken and other materials have been named, none of them have, except under quite local conditions, taken actual

shape. Still, from time to time, materials are brought forward that supply potash, though, so far, none of them exist in any great quantity. The refuse from beet-sugar purification, the 'argol' (tartrate of potash) obtained in the fermentation of wine, and the sweepings of flues in works where iron and manganese ores have been smelted, are all utilised so far as they go. The last-named material has about the same amount of potash that kainit contains (10 to 15 per cent.), the potash being present partly as sulphate and partly as carbonate. It would not appear, however, that the quantity of this available exceeds 3,000 tons annually. The present price is £7 to £9 per ton, or 7s. 6d. per unit per ton of sulphate of potash. For some time there has been talk of extensive deposits of potash salts in Catalonia (north of Spain), but nothing has so far been done to develop these. Indeed, I have heard it hinted that, previous to the war, the Stassfurt people were interesting themselves in the development of this source.

"Yet another supply has been heard of in potash salts of high quality, obtained by somewhat difficult refining, from districts bordering the Red Sea. These are sold on a basis of 80 per cent. sulphate of potash, and of them about 6,000 tons annually are said to be available. Peruvian guano, as already observed, contains some amount of potash, and so may acquire a special value at this time. The review of these supplies, and the fact that we are at the present time going on with our agriculture without renewing the potash supply, naturally raises the doubt as to whether the oft-preached doctrine of potash for crops has not been 'overdone.' Certain it is that the land is not yet suffering a potash starvation, and when I look at the Rothamsted records in the case of heavy land, and my own on light land (though carried out for a much briefer period), I confess that I fail to see the clear evidence of potash being as urgently required as has been put forward. No doubt there are certain crops—such as potatoes, mangels, clover, fruit, hops, &c.—which benefit largely from the application of potash; but if farmyard manure can be supplied in sufficiency it will probably give all the potash that is wanted, while for ordinary corn crops—such as wheat, barley, and oats—it is very questionable if potash is required under ordinary circumstances and in rotation-cropping. Indeed, I confess that I am beginning to wonder whether, just as with basic slag and the 'citrate solubility,' the need of potash for crop-growing has not, to a great extent, been the outcome of an enterprising 'trade policy' rather than a truth founded on actual facts of science and practice.

"However that be, I must say that I regard far less seriously than I did at first the shortage of potash salts so far as agriculture is concerned."

During the discussion which followed the reading of Dr. Voelcker's paper, Mr. J. W. Hughes said he agreed with the author that the value of potash had been over-estimated, as he knew of land which had received no potash dressing for twenty years, or farmyard manure or potash-containing manure of any kind, which had yet grown splendid crops of some kinds of vegetables, provided that it was supplied with nitrogen and phosphates. As regards potatoes, the non-application of 1 cwt. of

sulphate of potash had made, in twenty consecutive years, an average difference of 1 or 2 tons of potatoes an acre. Potash salts were useful in the case of potatoes, and when they could not be obtained, farmyard manure should be used, and withheld from such things as turnips and wheat which did not need it.

A NEW MAIZE SECRET.

Reports to hand by the last American mail announce an interesting development in maize-growing experiments. Certain tests have been conducted by officers of the School of Agriculture of the University of Minnesota. If future tests sustain the present indications, every bushel of maize planted may be made to send up more sprouts, and these sprouts may grow so fast that several weeks may be gained in the maturing time of the corn. Scientists at the Minnesota University Farm believe that they have discovered, quite by accident, a commercially practicable method of increasing the germination rate of seed maize. It came about in experimenting with various insecticides to be used in treating grains.

Professor Wm. Moore, of the Entomology Department, and Professor H. K. Hayes, of the Agronomy Department, have been working on fumigation processes for killing grain parasites. It is important that germination qualities of grain treated should not be impaired in fumigating, so they regularly checked plantings of the untreated. It was in connection with the use of nitro benzine that they bumped into the unexpected. They found that not only was the grain not impaired for seed purposes, but that it was actually bettered. Maize seemed to thrive on the fumes of nitro benzine. Not only was the percentage of germination increased by treatment, but the rate of germination also was speeded up. The experimenters checked and rechecked, again and again, with the same results. An experiment with 1911 maize, for instance, brought out the fact that the fumigated seeds sprouted nearly two days before the unfumigated when planted at the same time, and of the former about 18 per cent. more kernels germinated than of the latter.

"We are not saying that the treatment will so result with all corn," Professor Moore said, "as our experiments have not gone far enough to justify so sweeping a statement, but we expect to wind up the most significant test of all on the subject shortly, after which we shall have something to announce. Nitro benzine is an oil, a coal tar derivative. Its price has been raised somewhat by war causes, but it is commercially obtainable. We fumigate the corn by placing it in a closed box in which is suspended a cloth saturated with the oil. The fumes do the work. We think well enough of present indications to make known our findings at this time, so that American farmers who are facing a critical seed maize situation may try out the process if they see fit. Why does the treatment so affect the corn? We haven't the slightest idea. We only know that it has had that effect with corn we have treated."—"Producers' Review."

PRESERVING MAIZE IN TANKS.

When maize is about to be tanked, it is essential that the grain be thoroughly dry. Exposure to the sun beforehand of what may appear to be a dry sample is recommended. The tank itself should be dried by lowering a can containing red hot coals into it before putting in the maize. The secret of preserving maize in tanks when they are not properly filled is to exhaust the oxygen by placing a lighted candle above the maize, and hermetically sealing the tank. Should it be found necessary to fumigate at any time for the prevention of weevil, all that is necessary is to open the tank and treat the grain with bisulphide of carbon. The usual dose is 1½ to 3 lb. of bi-sulphide to every 100 bushels of grain, according to the tightness of the tank. The liquid is either poured into saucers or on to cotton waste placed in dishes put on top of the grain to be treated. The lid is then tightly fitted on and made air-tight. Twenty-four hours is quite long enough to allow the tank to remain unopened—that is, if the grain is required for seed purposes. Care must be exercised not to place a light or to smoke near the fumes of the bi-sulphide, as the substance explodes very readily. After 24 hours the tank should be opened at top and bottom to allow the fumes to escape; hence some opening should be provided at the bottom which can be hermetically closed.

SUN HEAT FOR KILLING WEEVILS IN MAIZE AND WHEAT.

Investigations have been conducted in Great Britain and South Africa as to the effect of high temperature on maize or wheat weevils. At Salisbury, in Rhodesia, a sail was spread out on the ground, and a sample of wheat heavily infested with weevils spread over it. The temperature on the sail was 116 degrees Fahr. When the wheat touched the hot sail, many weevils flew away; the remaining ones died in a few minutes. A sample of the weevilly wheat from the sail was then placed in a jar, and nearly six months later no more weevils had bred out. The exposure to the sun heat had evidently killed the weevils in all stages—eggs, larvæ, and perfect fly. Subsequent experiments proved that 115 degrees Fahr. was the desirable minimum. Similar results have been obtained at Grafton Experiment Farm, and this simple method of ridding grain of weevils can be confidently recommended to farmers. A black tarpaulin will be found to absorb more heat than a white one.—"Town and Country Journal."

COTTON-GROWING IN NEW MEXICO, U.S.A.

The cotton-growing districts of all tropical and sub-tropical zones are comprised between the parallels of 36 degrees north and 36 degrees south of the Equator. The territory of New Mexico lies between the parallels of 32 and 37 degrees north latitude, and is consequently well within the cotton belt of the United States. Lately, experiments were made there in cotton-growing, which resulted in proving that the

territory was eminently adapted to cotton production. In the trials cotton was planted in rows 40 inches apart at the rate of 20 lb. of seed to the acre. A bushel of seed contains 120,000 to 150,000 seeds. This quantity is enough, if all seeds germinate, to plant 15 acres. Generally, however, from three-quarters to one and a-half bushels are planted per acre. Taking a bale of cotton at 400 lb., the yield was:—Of Burnett's Cotton, 1·47 bales of lint per acre; Durango, 1·46 bales; Allen's Imperial Triumph, 1·37 bales. Generally a crop of 1,000 lb. of seed cotton will give 400 lb. of lint. The result of this trial shows that the yield of seed cotton was 1,500 lb. per acre; and 600 lb. lint, worth 10d. per lb., gave a return of £25 per acre. The whole of the cotton-growing area of Queensland extends from 29 degrees south to 10 degrees south latitude; and is, therefore, well adapted to cotton-growing.

MARKET GARDENING.

HERB-GROWING.

Previous to the war, culinary herbs were mainly imported from Europe, especially from France. That source of supply being cut off, buyers of herbs on a wholesale scale in Australia are looking to the States of the Commonwealth to supply the deficiency. The climate of Southern Queensland, especially on the coastal ranges, is eminently adapted to the successful cultivation of herbs. In districts where cost of carriage precludes the possibility of ordinary heavy crops being profitably produced, the herb industry particularly recommends itself to farmers on account of the smallness in bulk of its products when compared value for value with other products—such as hay, chaff, maize, potatoes, &c.

Herbs are generally easy to grow from seed. If plants can be obtained, so much the better. They may be sown or planted out at any time between April and August. Where plants are not obtainable, the seed should be sown in rows drawn 1 foot apart, just deep enough to cover the seed. When the plants are up, they must be thinned out to 1 foot apart. During the summer, they must be well watered, the surface of the soil being kept loose and mulched. In autumn or early spring, to extend the area, take up and divide some roots, planting them 18 inches apart. New plantings should be made every winter, in order to supply the places of any that may have died out during the summer.

A MARKET FOR HERBS.

The most useful herbs, and in greatest demand commercially, are:—Marjoram, Sage, and Thyme; and with reference to the wholesale prices for these, the Department of Agriculture and Stock has received from Messrs. Loughland, Mackay, and Co., Australasia, Ltd., 235 Edward street, Brisbane, a letter in reply to an inquiry from the Department on the subject.

The above firm are desirous of purchasing the herbs named in considerable quantities, provided a decent sample can be offered, the buyers paying cash on delivery. At present supplies of such herbs cannot be obtained from Europe; hence an undoubtedly good opportunity is afforded to farmers and others in Southern Queensland to produce Australia's requirements in this line.

The firm quote prices which they paid in the past for rubbed, dried herbs, such as Marjoram, Thyme, and Sage, as follows:—

Marjoram, 50s. 9d. per cwt.; Thyme, 23s. 6d. per cwt.; Sage, 29s. 6d. per cwt. These prices are c.i.f. Australian ports. To them would have to be added local landing charges—about 10s. per ton of 40 cubic feet, and duty at the rate of 4d. per lb.—bringing the actual price of the imported article to 88s. per cwt. for Marjoram, 60s. 9d. for Thyme, and 66s. 9d. for Sage. The main difficulty would be the picking; but this could easily be done by female labour, as it is fairly light work.

THE CULTIVATION OF CULINARY HERBS.

SAGE.—Sage grows well in parts of Queensland, but does not like much heat. On the high coastal lands—as at Toowoomba, Warwick, Stanthorpe in the South-West, and Herberton in the North—it thrives well. It is easily propagated by cuttings, and, if planted about 15 to 18 inches apart each way, will soon cover the ground and keep down weeds. The dried leaves find a ready sale. According to the labour available, the plants may be hand-stripped, or cuttings may be made two or three times a year.

THYME.—Unlike the Sage plant, Thyme is able to stand a good deal of heat. It requires the same treatment in planting as Sage. Along with other culinary herbs, it is largely imported in a dry state for flavouring purposes, being very largely used in the butchering trade.

MARJORAM.—Plants may be raised from cuttings planted, say, in April if the weather be mild; but a better plan is to divide old plants into as many single-stemmed plants with a root or two as possible. These should be planted in well-worked ground at distances of 18 to 20 inches apart each way. A couple of chippings with the hand cultivator will be all that is necessary to keep down weeds, as the plants soon cover the ground. Two or three cuttings may be made every year. There is a very considerable demand for the dried leaves. As in the case of Thyme and Sage, Marjoram requires a deep, friable, loamy soil and a temperate climate, under which conditions it will grow to a height of 18 inches.

The leaves of herbs must not be dried in the sun or near a fire.

HERB-GROWING FOR WOMEN.

"Before the war Australia imported annually £10,000 worth of culinary herbs." What a staggering piece of information is this, given us in a bright and practical article, by Miss Annie S. Evans, in a Melbourne newspaper recently. With all our natural advantages and opportunities for growing herbs, to think that we have been importing them at this rate. We have no excuse but ignorance and indolence. Some of us are ignorant, some are indolent, some are both.

When the continental market was closed and the shortage began to assume serious proportions, and the demand became greater than the supply, we knew for the first time where we obtained our herbs. Not only Germany, but France, Italy, and the Balkans, supplied us.

One man—"out Ballarat way"—Mr. George Morgan, evidently is one of the few who has not suffered from the prevailing indolence, because for the last thirty years he has been a herb farmer. He has 16 acres under cultivation, which, we believe, is the largest farm of the kind in Australia. This year one firm alone is prepared to take his whole harvest. So here is an opportunity for the woman on the land!

This successful grower informed his interviewer that women could easily make a livelihood with herb-growing. But they must begin in a small way if they want to be successful growers. He suggests 100 cuttings as enough to start with, which can be added to every year. The first year's crop will be probaly small, but the crop will increase every year. June or July are the months for planting in Victoria, and the best aspect is an eastern one. A clay or sandy soil the herbs flourish in, but a moist soil is also good. The land should be twice ploughed, then harrowed, the cuttings then put in fairly far apart, and set in a square formation.

The crop is cut when in flower, which is about November, and the cutting should be done with a hand sickle used close to the ground. Every leaf is used, even the sifting; there is no waste whatever. A hoe, a sickle, flail, and a few baskets are the only necessary requirements.

In taking slips they should always be cut, never broken.

Marjoram, Thyme, and Sage are particularly referred to here, for which there is always a large demand by merchants and butchers. Sage is the most expensive, and as the new leaf is best a fresh supply should be sent out every season.

A very comforting assurance is given that no animal, mice, or rabbits will touch the herbs, nor does any pest molest them. Sheep will carefully graze among the herbs without touching them.

We hope that some of our women readers will be diligent enough to give herb-growing a trial, and shall be glad to hear of their success.—"Weigel's Journal."

GROWING MUSHROOMS.

Growing mushrooms in the open is one of the simplest forms of market-gardening. All that has to be done is to prepare the bed, "spawn" it; and in due course—namely, in Autumn—the mushrooms will appear. Beds should be prepared in time to admit of a crop appearing at the most suitable time. Mushrooms really grow all the year round, and may be gathered in quantities in the Spring season. The spawn is obtained from the parent plant, and much resembles a cobweb. This is preserved in bricks made of a mixture of turf and manure, and will keep for a long time in this condition. At the same time, mushrooms may be produced spontaneously from a bed of manure and earth properly prepared. Without spawn or seed of any kind, if the work is properly done, after a few weeks the mushroom will spring up from a bed of this kind, and will continue to appear for a month or six weeks. The crop, however, exhausts the bed, and preserved spawn must then be introduced.

PREPARING THE BED.

During January or February a quantity of horse droppings should be procured and spread out thinly under a shed till needed. Dig trenches, 1 foot deep and 4 feet wide, and into these throw the droppings to a depth of 9 inches. Ram or tread this down firmly to exclude the air as much as possible, thus preventing the droppings from overheating too much. Now (if spawn is used) break up the spawn bricks into pieces the size of a marble, and set them 1 foot apart, almost on the surface of the manure. If no rain should come, give the beds a fair sprinkling of water, and a few days afterwards cover the manure and spawn with 3 inches of fine soil. As heavy rains frequently occur in February, it is well to provide some shelter for the beds, as too much water is injurious to the spawn. If the weather is suitable, and the temperature of the bed range from 60 to 70 degrees Fahr., within a month or even less, after covering up the spawn with earth, tiny white buttons spring up at intervals all over the bed. These buttons rapidly develop into mushrooms, and in about from ten days to a fortnight are large enough to cut for the market.

RAISING MUSHROOMS WITHOUT SPAWN.

The manure must be well mixed with earth (or earth may be dispensed with) and laid down in a bed about 2 feet high and rammed or trodden down firmly, being slightly watered. In a few weeks the mushrooms will spring from a bed of this kind. A good shelter for it may be made out of half an old galvanised iron tank preferably enclosed with palings to exclude too much light. In France mushrooms are largely grown in tunnels and dark cellars; and when it is necessary to water the beds, the floor and walls are watered, not the bed.

PROTECTING CABBAGES AND RELATED VEGETABLES FROM ATTACKS OF THE CABBAGE ROOT FLY.*

The cabbage root fly is a pest which is widely spread over Europe, the United States, Canada, and other countries. The "Journal of the Board of Agriculture," London, for 17th March last, describes the fly as an ashen grey-coloured insect, not unlike the house-fly in general appearance, and measures about ¼-inch in length. The winter is passed in the pupa stage, and the first brood of flies appears in April or the beginning of May. There are most probably three generations in the year. The eggs are visible to the naked eye, and are laid close to or on the plant, usually just below the surface of the soil. The larvæ are typical fly maggots, of white or pale yellowish colour, and measure about ¼-inch in length when full grown. They commence injury by gnawing the outer layers of the young roots, afterwards making tunnels inside the main root; they may also invade the lower part of the stem. The pupæ are about ⅕-inch long, oval in form, of a light or dark-brown colour, and are found in the soil close to the plants.

As the result of the attacks of the maggots of this insect, growth of the affected plants is checked, the leaves flag and become discoloured, the roots are largely destroyed, and the plants die.

Many remedies have been suggested either for destroying the maggots or for preventing the fly from depositing her eggs near the plants. With very few exceptions, none of the known measures can be recommended as being sufficiently practical and efficient to merit adoption. In a recently-issued article on this insect, Gibson and Treherne† record having experimented with forty-eight different methods of treatment for combating this pest. They conclude, however, with the statement that the only protection to be relied upon in the case of cabbages and cauliflowers is the use of tarred felt paper discs.‡ Professor Goff,§ of Wisconsin, was the first to adopt these discs or protectors, and found them to be thoroughly reliable and practical. His method soon became widely adopted in North America, where the discs have been frequently tested on a large scale, with favourable results. In the British Isles the discs have never received the attention which they undoubtedly merit. Reports on their use are extremely few, and they have not previously been subjected to any exhaustive trials.

During the past season a series of critical experiments has been carried out in several localities, under the writer's direction. The most important trials were those undertaken by Mr. J. T. Wadsworth,‖ Research Assistant in the Department of Agricultural Entomology, Manchester University. These trials were conducted at Northenden (Cheshire) on land which was known to be heavily infested by the root

* The illustrations accompanying the article were from photographs reproduced in the "Journal of the Board of Agriculture" by permission of the editor of "The Annals of Applied Biology."

† "Bulletin 12, Dominion of Canada Dept. of Agric., Entom. Branch, 1916."

‡ These "discs" are really square-cut.

§ "8th Annual Report, Exp. Sta., Univ. of Wisconsin, 1891," pp. 169-173.

‖ For a full account of these experiments, *vide* J. T. Wadsworth, "Annals of Applied Biology," Vol. III., No. 2, 1917.

fly. They were made on both cabbages and cauliflowers grown on well-manured soil. Some 816 cabbages (Leeds Market variety) were planted out on 1st May, and the discs placed in position on the following day. The latter were obtained from America, and are 2½ inches square. Each is provided with a slit extending to a point ½-inch beyond the centre of the disc, and a shorter slit crosses it at right angles in the centre of the disc (Fig. 1).

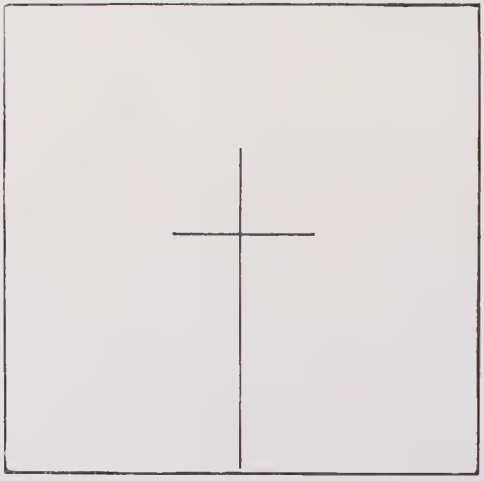

FIG. 1.—OUTLINE FIGURE OF A DISC; ACTUAL SIZE.

In order to obtain good results, it is desirable that the soil should be in a friable condition to enable the discs to be placed quite flat on the ground. They must be placed round the stems of the plants as soon as possible after the latter are planted out in the field (Fig. 2). Failure

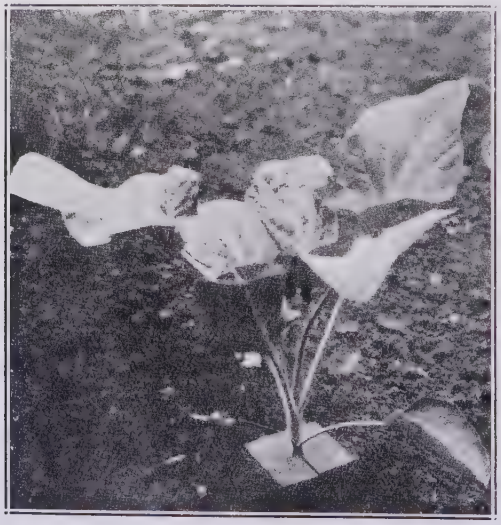

FIG. 2.—PHOTOGRAPH OF A BRUSSELS SPROUT PLANT SHOWING DISC IN POSITION.

to take this precaution often results in the plants becoming infested prior to the discs being applied, and the value of the latter is then lost. In the case of vegetables planted out earlier than May, this precaution is not so urgent, but the date of appearance of the flies varies according to the prevailing climatic conditions, and the location of the particular district concerned.

The main function of the disc is to act as a mechanical device to prevent the flies from laying their eggs in the usual position, close round the plants. It is, furthermore, important to keep the surface of the discs free from soil; otherwise the insect will deposit its eggs thereon, and the young maggots will readily gain access to the protected plants. Of the 816 plants used in Mr. Wadsworth's experiments, half were provided with the discs, and the remainder left unprotected. Only one plant was lost out of the 408 protected plants, while 54 of the untreated cabbages were severely attacked. With regard to cauliflowers, the results were even more striking; 932 plants were utilised, and, similarly, half of these were protected and the remainder left unshielded as controls. Only 24 of the protected plants were lost as compared with 294 of the unprotected plants.

In addition to experiments by Mr. Wadsworth, three market-gardeners undertook small scale trials. Full instructions were given in each case as to the method of application and the use of the discs. One grower, at Chorlton-cum-Hardy (near Manchester), who was supplied with 100 of the discs, reported that no case of root-maggot attack was noted where they were used, and that so far as his observation went they were successful. Another grower, at Prestwich (Cheshire), wrote that he had applied the discs to 50 cabbages, and, out of those, only 2 were attacked. Of 50 control plants most were infested. The third observer (at Nottingham) applied 100 of the discs, and reported that out of 84 protected cauliflowers only 5 were apparently attacked, and none were lost. Of 20 unprotected plants, 12 survived. He also experimented with 36 Brussels sprouts, 6 of which were provided with the discs. These all produced strong healthy plants, while all the unprotected ones were affected, 5 being completely destroyed.

Growers of cauliflowers and related vegetables are strongly advised to give these discs a fair trial. Their application is extremely simple, and can, if necessary, be undertaken by children. If they are placed carefully on the plants, no further attention, as a rule, is necessary. Once the plants have made good growth they have been tided over the most vulnerable period, and the soil can be earthed up over the discs, as the latter are then no longer necessary. The use of the discs is not the only measure advisable. The custom of cutting the vegetables and leaving the stumps to decay should be discontinued. The plants should be uprooted straight away in infested lands, as their stumps only serve as breeding places for fresh broods of maggots.

Arrangements have been made for the discs to be manufactured and sold at 1s. per 100, or 8s. per 1,000. The address of the maker may be obtained on application to The Secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	Jersey Herd Book of Queensland
J W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Frisian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Bock
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Frisian Herd Book of Queensland
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH APRIL TO 26TH MAY, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Margaret	Ayrshire	14 Sept., 1916	684	4·8	38·71	
Cocoatina ...	Jersey	6 Mar. 1917	589	4·8	33·33	
Lady Melba	Holstein	14 Feb., ,,	801	3·4	31·82	
Miss Edition	Jersey	25 Dec., 1916	547	4·8	30 96	
Violette's Peer's Girl	,, ...	13 Dec. ,,	433	6·0	30·77	
Twylish's Maid	,, ...	2 Nov. ,,	343	7·2	29·35	
Comedienne	,, ...	24 Nov. ,,	373	6·3	27·84	
Hedges Madge	Holstein	22 Mar., 1917	657	3·6	27·70	
La Hurette Hope	Jersey	6 Oct., 1916	236	6·3	27·61	
Miss Betty	,, ...	27 Mar., 1917	613	3·8	27·31	
Thornton Fairetta	,, ...	26 May, 1916	312	7·2	26·70	
Glade ...	Shorthorn... ...	29 Mar., 1917	645	3·4	25·62	
Iron Plate ...	Jersey	9 Dec., 1916	444	5·1	25·53	
Lady Spec...	Ayrshire	17 Jan., 1917	548	3·9	25·07	
Sylvia II. ...	Shorthorn... ...	16 Jan. ,,	570	3·6	24·05	
Lady Doris	Ayrshire	2 April ,,	521	3·8	23·22	
Jeannie ...	,, ...	27 Oct., 1916	426	4·6	23·08	
Lady Annette	,, ...	11 Nov. ,,	406	4·8	22·97	
Glen ...	Shorthorn... ...	18 Jan., 1917	435	4·4	22·52	
Constancy ...	Ayrshire	27 Dec., 1916	458	4·0	21·50	
Miss Security	Jersey	27 Mar., 1917	573	3·2	21·39	
Miss Bell ...	,, ...	1 Aug., 1916	272	6·6	21·29	
Hedges Dutchmaid	Holstein	22 Aug. ,,	406	4·4	21·03	
Belinda ..	Ayrshire	23 Feb., 1917	525	3·4	20·86	

A clerical error was made in last month's report; the cow giving the highest yield was Lady Margaret, not Lady Dorset, as stated.

The cows were grazed on natural pastures supplemented by a ration of maize silage mixed with wheaten chaff.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MAY, 1917.

The total number of eggs laid during the month was 4,193. Twenty pens have two or more birds moulting. The health of the competitors generally has been good. C. Porter had the misfortune to lose one of his pullets with ovary trouble. Westerly winds and cold nights during the early part of the month threw some pens back, but, should the present warm days continue, they should speedily come round again. Mr. E. Chester again wins the monthly prize in the light breeds; while Mr. Claussen scores in the heavies. The following are the individual records:—

Competitors.	Breed.	May.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	121	239
W. Becker...	Do.	119	210
G. Chester	Do.	91	195
W. Crust	Do.	83	187
Oaklands Poultry Farm	Do. ...	109	184
A. H. Padman, S.A.	Do.	80	177
*G. H. Turner	Do.	103	176
T. R. Hawkins	Do.	86	172
T. A. Pettigrove, Victoria	Do.	106	170
*J. R. Wilson	Do.	60	168
T. Taylor	Do.	83	162
*J. Zahl	Do.	90	162
*A. W. Bailey	Do.	82	157
R. Holmes	Do.	74	150
F. W. Leney	Do.	105	149
Mars Poultry Farm	Do.	78	147
C. Porter	Do.	69	141
C. Knoblauch	Do.	89	133
J. G. Richter	Do.	63	126
*A. T. Coomber	Do.	76	126
E. Cross	Do.	45	121
*Mrs. J. D. Munro	Do.	87	117
Moritz Bros., S.A.	Do.	94	110
G. Williams	Do.	51	109
Mrs. W. D. Bradburne, N.S.W. ...	Do.	40	107
D. Fulton	Do.	39	107
*Dixie Egg Plant	Do.	88	100
C. H. Singer	Do.	38	97

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	May.	Total.
LIGHT BREEDS—*continued.*			
F. Clayton, N.S.W.	Do.	58	96
A. Shillig	Do.	35	95
Mrs. J. Carruthers	Do.	32	91
Mrs. S. J. Sear	Do.	24	89
Quinn's Post Poultry Farm	Do.	33	87
Kelvin Poultry Farm	Do.	70	87
*T. Fanning	Do.	28	85
*J. M. Manson	Do.	71	76
Miss M. Hinze	Do.	60	73
L. G. Innes	Do.	34	71
*G. C. Dennis	Do.	65	66
J. L. Newton	Do.	35	65
C. P. Buchanan	Do.	28	60
E. A. Smith	Do.	33	56
J. Holmes	Do.	33	52
J. Ferguson	Do.	35	44
*Dr. E C. Jennings	Do.	31	43
S. C. Chapman	Black Orpingtons	22	38
G. Howard	White Leghorns	34	34
G. J. White	Do.	27	33
*A. E. Walters	Do.	30	30
HEAVY BREEDS.			
F. A. Claussen	Rhode Island Reds	101	177
*R. Burns	Black Orpingtons	91	167
W. Smith	Do.	79	159
A. E. Walters	Do.	77	158
H. Jobling, N.S.W.	Do.	68	140
*Mars Poultry Farm	Do.	81	135
D. Kenway, N.S.W.	Do.	57	131
W. G. Hanson, N.S.W.	Do.	77	116
Cowan Bros., N.S.W.	Do.	60	100
F. Clayton, N.S.W.	Rhode Island Reds	80	94
P. C. McDonnell, N.S.W.	Black Orpingtons	58	91
Mrs. J. H. Jobling, N.S.W.	Do.	45	71
*Oaklands Poultry Farm	Do.	39	64
*C. F. Dennis	Do.	56	56
*Kelvin Poultry Farm	Plymouth Rocks	34	42
King and Watson, N.S.W.	Black Orpingtons	32	38
*F. W. Leney	Rhode Island Reds	28	38
C. R. Bertelsmeier, S.A.	Black Orpingtons	21	32
C. C. Dennis	White Wyandottes	24	24
E. Morris	Black Orpingtons	0	13
*E. A. Smith	Do.	10	11
J. M. Manson	Do.	11	11
R. Burns	S. L. Wyandottes	3	3
*Miss M. Hinze	Black Orpingtons	1	1
Totals	...	4,193	7,432

* Indicates that the pen is engaged in the single hen test.

RETURNS FROM SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
G. H. Turner	9	31	37	34	29	36	176
J. R. Wilson	30	28	22	33	39	16	168
J. Zahl	31	21	40	14	36	20	162
A. W. Bailey	32	7	31	28	28	31	157
A. T. Coomber	26	4	29	27	10	30	126
Mrs. Munro	41	26	18	7	0	25	117
Dixie Egg Plant	18	14	19	31	18	0	100
T. Fanning	6	28	13	15	4	19	85
J. M. Manson	15	7	9	5	13	27	76
C. C. Dennis	12	5	0	14	15	20	66
Dr. Jennings	0	0	2	7	26	8	43
A. E. Walters	0	1	1	12	16	0	30
HEAVY BREEDS.							
R. Burns	20	0	38	8	47	54	167
Mars Poultry Farm	27	37	13	37	11	10	135
Oaklands Poultry Farm	28	0	0	0	36	0	64
C. F. Dennis	1	0	31	18	16	0	56
Kelvin Poultry Farm	14	0	0	28	0	0	42
F. W. Leney	0	0	0	0	26	12	38
E. A. Smith	1	0	0	10	0	0	11
Miss H. Hinze	0	0	0	1	0	0	1

POULTRY FLOOR SPACE.

For Leghorns, the allowance for floor space is generally 4 square feet. A house 10 feet square has a superficial floor space of 100 square feet. This will be sufficient for 25 hens. Less space is not allowable, because the active Leghorns require quite as much space as the larger breeds.

The Orchard.

SUBSOILING THE ORCHARD BY EXPLOSIVES.

The value of explosives in preparing land for fruit-tree planting as well as for renovating a neglected orchard has frequently been demonstrated in practice in Queensland, and during the past month we have seen the effect of dynamite charges in getting land ready for tree planting within a few miles of Brisbane. With a single plug of dynamite placed at a depth of 15 inches in a hole made by an iron bar, the subsoil was shattered to a depth of nearly 3 feetand laterally to 4 or 5 feet. The following paper, written on the subject by G. N. Hyam for the "New shattered to a depth of nearly 3 feet and laterally to 4 or 5 feet. The Zealand Farmer, Stock, and Station Journal" (May, 1917), deserves to be carefully studied by orchardists in this State:—

"Subsoiling by explosives is," as Mr. Hyam says, "a principle sound in theory and effective in practice."

"The principle of subsoiling, or trenching, is probably the first axiom of farming and horticulture. It was practised by the Romans, and is advocated by all those quaint writers on the 'Arte of Husbandrie' whose books are a source of enjoyment to all modern agriculturists and

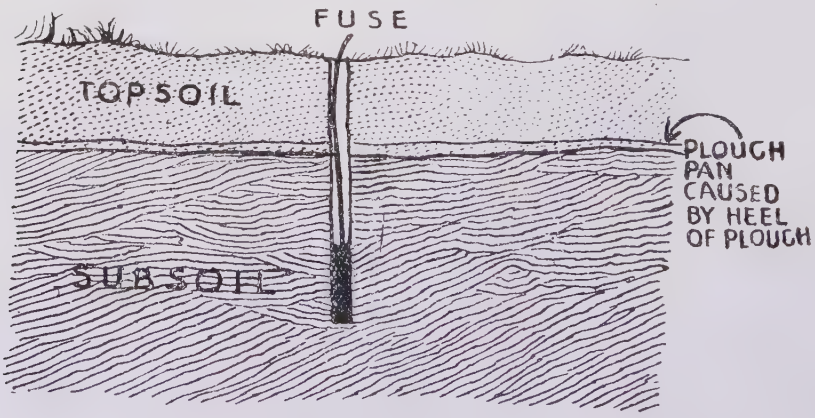

FIG. 1.—METHOD OF INSERTING CHARGE IN NORMAL LAND.

horticulturists who read them. In France the modern vignerons, following the practice of centuries, seldom, if ever, plant their vines without deeply trenching, in spite of the heavy cost of spade cultivation. In the new countries the cost of trenching, or even of subsoiling with the subsoil plough, is almost prohibitive, although the benefits of deep stirring of the soil are generally admitted. The use of explosives for this stirring, although not quite so effective as thorough trenching with

the spade, is a cheap and speedy method which is more efficient than some subsoil ploughs, owing to the fact that the latter only breaks the soil to a depth of about 18 inches, and, furthermore, it leaves a hard layer immediately under the plough sole. The cost of subsoiling with the plough is also almost beyond the average orchardist on account of the

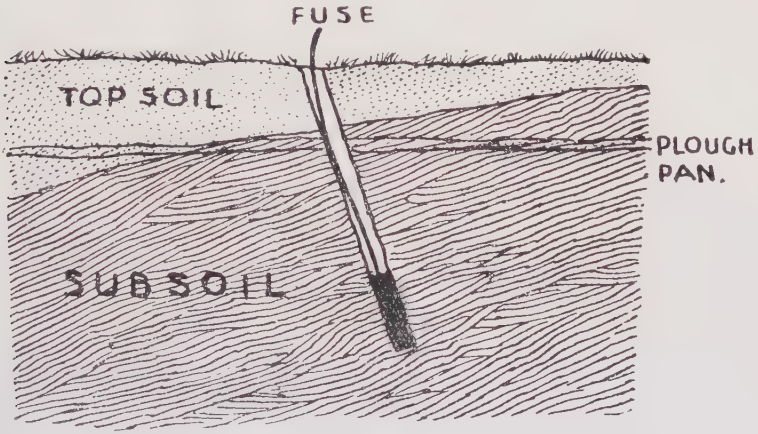

FIG. 2.—METHOD OF INSERTING CHARGE WHERE THE STRATA SHOWS AN INCLINATION, I.E., AT RIGHT ANGLES TO THE DRIFT OF THE SUBSOIL.

heavy draught required, whilst the cost of explosives for the same work is within the reach of everyone. In this article it is only intended to deal with the question from the point of view of the orchardist, but it is equally applicable to agriculture, particularly in the cultivation of root crops, maize, lucerne, and all deep-rooting crops. Too little attention is often given to the preparation of the soil prior to planting an orchard; a

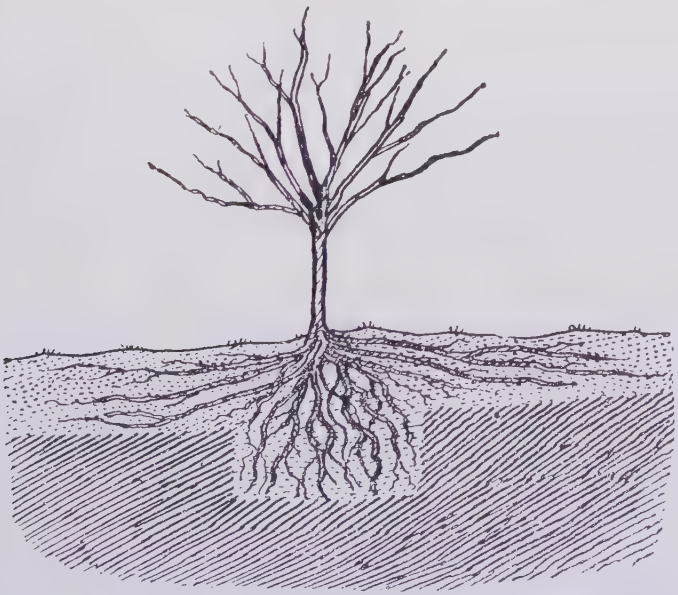

FIG. 3.—ROOT SYSTEM OF YOUNG TREE IN A SPADE DUG HOLE, SHOWING TENDENCY TO RUN PARALLEL TO SURFACE.

hole is hurriedly dug in roughly ploughed ground, and no care is taken to develop a strong root system. The grower will often take particular care of the shaping of his tree and the after cultivation, without paying any attention to the root system which has as much or more effect on the development and fruiting of the tree as anything that can be done above ground. The fruit tree is common with all plants, is dependent for its growth and vigour on the supplies of water and mineral contents of the soil which its roots extract from both the top soil and the subsoil. No amount of surface manuring or cultivation will compensate for the immense supplies available in the subsoil, and to get full results from the tree as a crop producer we must promote a vigorous growth of those fibrous roots which are the main feeders. These roots are prone to follow the lines of least resistance; and if they strike hard ground such as is caused by the plough sole, or even the walls of a spade-dug hole, they will inevitably travel in a horizontal direction, instead of striking into the subsoil and making available those supplies of mineral food and moisture that are stored therein.

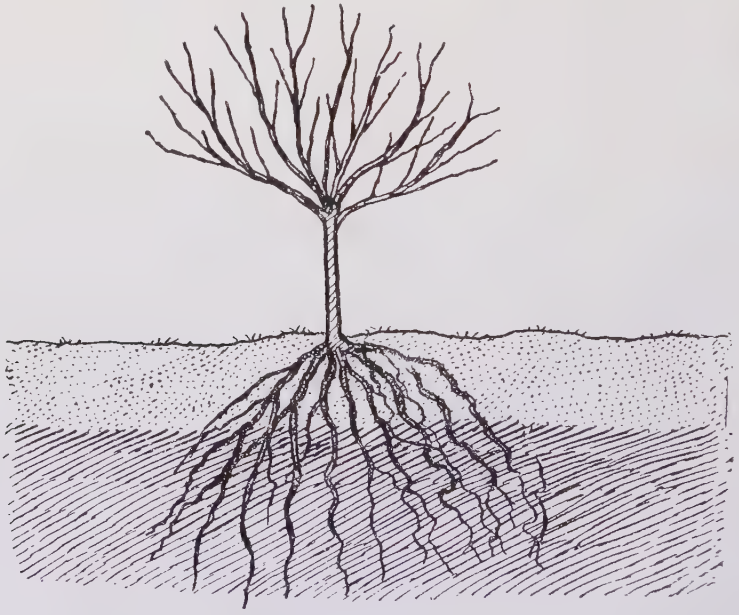

FIG. 4.—ROOT SYSTEM OF TREE PLANTED IN SUBSOILED OR TRENCHED LAND.

"A shallow spade-dug hole has the effect of forming a sump or drain for the surrounding soil, particularly where the land has a clay subsoil, and a tree with 'wet feet' is a prey to all fungus diseases. The use of explosives for tree-planting, when carefully carried out with the proper charges, entirely obviates this danger. All the large explosives manufacturers now make a special farmer's explosive, with carefully graduated charges, which are designed to give best results in subsoiling, and which are safer to handle than ordinary dynamite or gelignite. They are almost as safe as an ordinary gun cartrideg until the detonator is fixed; some of them being non-explosive until they are immersed in a special liquid just

before laying, and the whole operation can be conducted by anyone of ordinary intelligence if he studies the local soil conditions.

"The system which the writer has successfully adopted is a simple one. An ordinary 2-inch auger is used, with the shaft lengthened to 6 feet in detachable sections of 2 feet, any blacksmith being able to make this alteration. I then make several trial bores, for the full length of the auger, to ascertain the nature of the subsoil by carefully watching the earth brought up. It is also advisable to notice whether the different strata or layers of soil show any inclination, as it gives better results by placing the charge at right angles to the strata. All the manufacturers issue comprehensive instructions, giving the methods of attaching the fuse, the amount required of their respective brands for various soils, &c.; but it may be noted here that clay soils require the deepest bores and heaviest charges, sandy and alluvial type the shallowest holes and the lightest charges. I have found that in my experience the best results are obtained by boring three holes at the points of an equilateral triangle whose sides have a length of 4 feet; the triangle to have the proposed site of the tree in the centre. These holes are bored with the auger from 2 to 4 feet in depth, according to the nature of the ground, and a half, three-quarter, or full plug, with detonator and fuse attached according to manufacturer's directions, inserted. The charge should be well tamped down with a wooden rod—a metal rod is dangerous—and fired.

"A successful blast should show a gentle uplift of the ground, and it should be possible to insert an iron rod anywhere in the radius of the blast, to a depth of 5 or 6 feet, by a simple pressure of the hand. If a crater has formed, the charge has been too heavy or the bore too shallow;

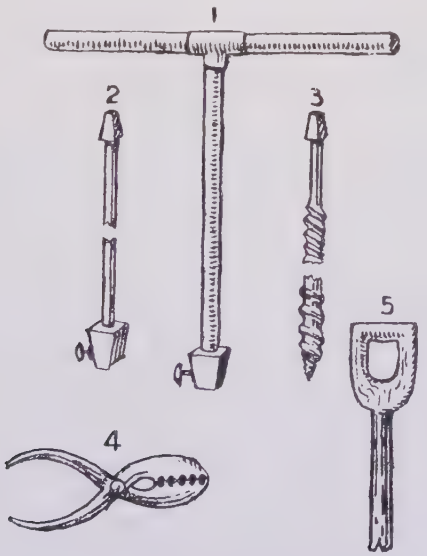

FIG. 5.—TOOLS REQUIRED.

(1) Auger handle. (2) Auger extension. (3) Auger 2 in. in diameter. (4) Gasfitter's plyers, for crimping detonators onto fuse. (5) Wooden tamping rod, 3 ft. long and 2 in. thick.

the soil removed should be carefully replaced and stamped down, as otherwise cavities will have been formed which will be a catchment or sump for water.

" In the case of clay soils the clay rarely extends more than 6 feet, and the charge should be inserted at a point three-quarters of its extent; the blast will then render the whole quite porous. In gravelly soils the charge should be fired at about 2 feet from the surface, whilst in sandy or alluvial soils it should be placed just under the " hard-pan " which is nearly always present.

" Subsoiling by explosives may easily be carried out on an established orchard by placing slightly heavier charges in a triangular position, the sides of which should have a length equal to the diameter of the circle covered by its outside limbs. If any of the trees in your orchard are making poor growth, or are not so vigorous as their neighbours, and seem to be particularly susceptible to fungus diseases—such as black spot, ripe rot, &c.—blasting will probably restore them to normal, for in nine cases out of ten ' wet feet ' is the cause. It frequently happens that there is a thin strata of clay under such trees that is preventing effective drainage. The effect of subsoiling on the growth of young stock is surprising; and it is an interesting experiment to lift two young trees—one from blasted ground and another one from a spade-dug hole—to compare the root system. In the first case the fibrous roots will have gone down almost perpendicular, whilst in the latter they will be horizontal.

" The best time of the year to do this work is in the early autumn where the trees are to be planted the following winter; and the best results are obtained when carried out after a dry spell, damp soil being rather resistant to the effects of the discharge, with the result that the ground is not broken up into the fine particles that are desirable to allow the nitrogenous bacteria to have the air and moisture they require to carry on their beneficent work.

" Growers of citrus fruits, particularly lemons, will find that they will derive special benefit from subsoiling by this means. The lemon is supposed to be a surface-rooting tree, but some years ago I tried planting them in blasted ground, with the result that their development was very fast. These trees always had a good deep green colour on the leaves, which proved that they had found good stores of nitrogen, and that the nitrogenous bacteria had been active through the thorough aeration of the soil. We also found that the so-called surface roots had taken a downward course, and I now believe that these roots are only compelled to come towards the surface where supplies of nitrogen are lacking."

ROOT SYSTEM OF FRUIT TREES.

In reply to a request by a fruit-grower at Proserpine for some information on the above subject, Mr. C. Ross, Instructor in Fruit Culture, says:—" Long experience in Queensland has taught us that a deep-rooted system for citrus and many other fruit trees gives the best

results, and surface roots should be discouraged by continuous cultivation. Surface roots are too susceptible to every climatic change. During light continuous rain, a mass of small surface roots is produced, which die off during drought and are apt to encourage root fungus; they also cause a growth of small twiggy, useless shoots; whereas the roots in the cooler strata, with a more equitable temperature, produce a steady growth of robust, well-ripened wood which soon hardens off into a good bearing habit. The surface soil should be kept in the state of a soil mulch by continual scarifying. Deep tap roots (like those of pear trees) penetrating deep into an uncongenial subsoil should be pruned off."

REMARKABLE GROWTH OF A BANANA TREE.

A correspondent writes to the "Agricultural News," Barbados, from Antigua to say that he has observed a banana tree exhibiting unusual features of development. The tree to which reference is made, after it had borne a large bunch of bananas, was cut down, as usual, leaving about 12 to 14 inches of stump, around which were several suckers. Instead of the stump withering, as is usual, it commenced a fresh growth from the centre, as occurs in the case of young trees that have not borne. This shoot rapidly developed, sending out leaves, and finally grew to be a second tree, while the suckers all withered and died. The growth of the tree did not end there. After being manured, and the soil having been forked, the plant sent up two new suckers, and a second bunch of fruit has been put out, not coming up as usual out from the side, but it has shot up vigorously, as if from the heart of the tree, almost perpendicularly at first, though later its weight has inclined it so that it rests supported on the apparently abnormal growth of leaves. The editor of the "News" says that a similar case was recently noticed in a garden in Barbados. The growth described is, of course, abnormal; and it is difficult to assign any definite cause to the event.

RECKONING AMOUNT OF HAY.

A subscriber wants to know how to estimate the amount of hay in a stack. Four hundred cubic feet of hay is roughly estimated as a ton, but there is great variation in the weights of hays compared with volumes. These variations are dependent upon the kind of hay, time of cutting, and treatment in storing.

To estimate the measurement, multiply the length, width, and height of stack together. For example, if the stack is 40 ft. long, 16 ft. wide, and 18 ft. from the bottom to the top, the stack will contain 40 x 16 x 18, or 11,520 cubic feet; 11,520 cubic feet divided by 400 gives 28·8 tons.

Viticulture.

THE ALCOHOLISATION OF WINES.

By C. A. GATTINO.

(1.) Is the addition of alcohol necessary?

(2.) If so, is it detrimental to the hygiene?

(3.) In the affirmative case, when and how has it to be done?

(4.) Is the alcoholisation the best and only corrective for rendering conservable weak and defective wines?

These are questions worth while examining as an enlightenment to the wine-grower and the consumer, and as a guide to our competent authorities in the formation of Acts relating to the wine industry.

My replies are the following:—

In Pro.

For nearly all wines derived from diseased grapes, an addition of spirit is adapted; but same will have to be made with certain rules, which I will explain later on.

These ill-made wines are of difficult conservation, because they are deficient in alcohol; whilst they contain excessive quantities of azotate matter and very probably special ferments not yet studied. For the said reason these kinds of wines are easy alterable and require more often topping up and sulphurating. But if these precautions are efficient for the conservation of the wines, they are not effective for improving its quality. An adequate addition of good alcohol would certainly assure the conservation of the said badly-made wine, and make it tastier and more hygienic. In saying "more hygienic," I want to make several distinctions. The alcohol we find in the trade is generally detrimental to health; and it is only by the careful choice of the spirit required for fortifying, and by the adequate dosage, that we can prevent laws completely prohibiting the use of the alcohol in the preparation of spirituous beverages. The more ethylic alcohol is contained in the spirit, so much more hygienic is the latter. The spirit extracted from the wine, well rectified and purified, is the only one which contains practically all ethylic alcohol, and is therefore the most hygienic and the most appropriated for fortifying wines.

On the other hand, the spirit of potatoes—which contains amylic alcohol—and the spirit of beetroot or grains (cereals)—which contain propylic, butylic, and amylic alcohol—are more or less hurtful according to their degree of rectification.

The following preferential order has to be given to the well-purified spirits offered by the trade:—(1) Spirit of wine; (2) spirit of grape residues; (3) spirit of beetroot; (4) spirit of grain; and (5) spirit of potatoes.

I will exclude from the choice the spirit of grape residues, which, although well rectified, will always give to the wine a certain taste of "schnapps," and also the alcohol of potatoes, which has injurious effects on the human organism and has never a neutral taste or smell.

We, therefore, have only these three to choose from:—Spirit of wine of at least 48 per cent. o.p.; spirit of grain of at least 66 per cent. o.p.; and spirit of beetroot of at least 66 per cent. o.p.

These spirits, added to the wine in proper and in adequate quantity, can be considered as not hurtful; and the wines so fortified can be considered more hygienic and conservable than the natural wines produced from diseased grapes.

The Academie De Medicine of Paris—in the congress held in 1886—resolved that the alcoholisation of weak natural wines marking not more than 18 degrees Sykes (or 10 parts per centum of alcohol) can be tolerated from the health point of view if the alcoholisation is made of pure spirit and in quantity not above 2 per cent. And the same can be applied to the above-mentioned ill-made wines. Let us see when and how the alcoholisation should be made:—

When?—I would do same when the wine has to be racked off. The wine, during the Winter having formed sedimentations, needs to be taken away from the dreggy deposit before the warm temperature of the Spring starts. Make ready first the casks into which the clear wine has to be transferred, and pour into the bottom of the cask the necessary quantity of spirit required for the alcoholisation. Then rack off the wine, slowly pouring the latter above the spirit so as to obtain an intimate mixture.

How?—I have already told. By pouring the spirit into the cask before the wine. The dosage depends on the natural alcoholic degree of the wine to fortify; it is, therefore, not possible for me to tell you now the quantity of spirit that should be used. What, however, I will point out is that weak wines do not allow of a too high alcoholisation. The wine would lose all equilibre, acquiring a peculiar burning taste, caused by the disproportion between the wine substances and the spirit.

As I stated, this alcoholisation could be tolerated at the proportion of 2 per cent., and only when the wine resulted unexpectedly weak and ill, independent of the willingness of the wine-maker.

In Contra.

By my article on "The Viticulture and Wine Industry after the War," which appeared in the May issue of the Journal, you could see that I do not like the alcoholisation of wines, and I advised the competent authorities to prevent such alcoholisation as much as possible.

The spirit, not being able to completely incorporate itself into the wine, as soon as it enters into the stomach of the consumer, evaporates, throwing its fumes up to the head, thus producing the sad consequence of drunkenness.

By restrictive legislation in the sale and use of spirits (*i.e.*, State Monopoly), we would attain an increase in wine consumption and a

decrease of the reasons giving existence to the abstinence societies. Legislation should, therefore, facilitate the "sugaring" of the "must" (grape juice) only before or during its fermentation, which practice would attain the same end of the alcoholisation without entailing the same bad consequences. Owing to the special conditions of the sugar industry in the State, this practice would be of great benefit to Queensland, and we would keep the money in our State, instead of buying spirits from other States or abroad, as is actually done. Certainly adequate laws should regulate the use and the permits for sugaring the must for those localities where unfavourable seasons have affected the soundness of the crop.

In any case, the wine-maker has, before all, the very natural way of raising the strength of weak wines, which is:—The blending of the weaker wine with a stronger one.

Especially here in this country, where there is such a great variety of climate, soil, and altitudes able to produce wines with a natural alcoholic title varying from 20 degrees to 30 degrees Sykes, the wine-maker should not need to raise the strength of the wine with the spirit; but in case it should do so, owing to exceptional bad conditions of the season, then the "*sugaring of the must*" is the next best practice.

The addition of sugar to the sour *must*, derived from unripened or ill-grapes, is also a real necessity; and the sugar to be preferred for this addition is just the sugar of cane.

My conclusive opinion about the alcoholisation of wines is that all wines which were fortified with spirit should be sold as such, whether as draught or in bottles. I consider that the public consumer has the right to know what sort of wine he is getting—either the natural wine or the one fortified with spirit.

And, again, the sale of wines fortified with spirit, offered to the consumer under the same classification of the natural wines, is an injustice to the public consumer, to the small wine-grower, and is detrimental to the progress of the wine industry.

AN AUTOMATIC FROST KILLER.

"Popular Mechanics" describes the invention of a simple thermostatic controlling device. A Los Angeles man has developed an ingenious apparatus for rendering the smudge pots used by orchardists self-operating. The appliance, which may be fitted to any standard type of pot, is regulated by a small copper rod. When the atmospheric temperature drops to a predetermined point, the contraction of the rod is sufficiently great to release a cup containing an acid. The liquid is poured into a small chamber provided in the smudge pot. This holds a chemical substance which burns upon the addition of the acid, producing a flame that ignites the crude oil used in the pot. The thermostat may be adjusted so as to release the acid when the temperature falls to any specific degree. With this apparatus in use, an orchard may be protected from frost without personal attention being given it. The pots are placed beneath the trees and brought into use automatically when they are needed instead of having to be lighted by hand.

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND

By C. T. WHITE, Acting Government Botanist.

No. 9.

On the Species of Datura (Thorn Apple) Naturalised in Queensland.

"STRAMONIUM" OR "COMMON THORN APPLE" (*Datura Stramonium, Linn.*).

Description.—A coarse, ill-scented weed of annual duration. Stems pale green. Leaves irregularly cut and toothed, dark green above, paler beneath, on short leaf-stalks. Flowers white, trumpet-shaped, solitary in the forks of the branches. Capsule ovoid, prickly, opening at the top when mature into several valves (usually four). Seeds numerous, dark brown or blackish, flat and wrinkled.

A very common weed of waste places and of cultivation almost throughout the State. It is more commonly known in Queensland as "Stramonium."

It is widely spread over the whole world, with the exception of the colder, temperate regions. Like many other widely-distributed plants, its country of origin is doubtful. In America it goes under the name of "Jimson Weed."

Properties, Uses, &c.—The whole plant is poisonous. It is, however, usually left untouched by all classes of stock. Drying does not destroy the toxicity, and in the United States it is recorded that cattle have been poisoned by eating the young leaves dried in hay. There are cases on record of children having been poisoned through eating the seeds and putting the flowers in their mouths. In South Africa the seeds are said to be fatal to young ostriches. Both seeds and leaves are used medicinally. In a long account of the medicinal properties of *Datura*, Bentley and Trimen state—"In asthma, catarrhs, and other cases the dried leaves are smoked like tobacco, or inhalation from their infusion in hot water is resorted to. But its use in these directions requires caution, as it has proved highly injurious and in some instances fatal. In the form of ointment, fomentations, &c., the leaves and seeds of different species of *Datura* have been found useful in allaying pain, &c. Locally applied to the eye, *Stramonium* produces dilatation of the pupil."

PURPLE THORN APPLE (*Datura Tatula*, Linn.).

This principally differs from *Datura Stramonium* in its flowers being of a purple or lavender colour paling to white in the throat. The stems, leaf-stalks, principal veins of the leaves, and capsules are all of a deep purple, not pale green as in *D. Stramonium*, of which by many it is regarded—perhaps correctly so—as a variety. For the sake of

PLATE 1.—DATURA TATULA (PURPLE THORN APPLE).

The common form (D. Stramonium) mainly differs from this in having pale green stems and white flowers.

PLATE 2.—DATURA FEROX.
A "Thorn Apple" new to Queensland.

convenience it is here recorded as a separate species. It is not quite so common in Queensland as *D. Stramonium*. Its range, properties, uses, &c., are the same.

A "THORN APPLE" NEW TO QUEENSLAND (*Datura ferox*, Linn.)

Description.—An ill-smelling, coarse, annual weed. The young shoots pubescent. Stems pale-green, puberulous. Leaves coarsely toothed, beset with a few scattered hairs. Flowers white, solitary in the forks of the branches. Capsule puberulous, covered with long, large spines.

Specimens of this week were collected at Macalister, Western Darling Downs, by Mr. E. W. Bick a little over a year ago, who stated that it was the common species in that district; it was then determined as *D. ferox*, but, having little information about the plant in the literature available here, specimens were sent to the Royal Botanic Gardens, Kew, England, and the identification confirmed. Mr. E. Kenny, Macalister, to whom we are indebted for the specimen here figured, states (May, 1917):—"The council men call it 'Stramonium,' and have pulled and cut it nearly all out, and the cold weather has settled the rest for this season." The local name is apt to cause confusion with the commoner species.

Properties, Uses, &c.—The whole plant, like others of the genus, is poisonous. It no doubt possesses properties similar to if not identical with *D. Stramonium*.

Country of Origin.—I cannot at all say how the plant came here. According to Engler and Prantl ("Die Naturlichen Pflanzenfamilien") and to Koorders ("Excursionsflora von Java"), the species is native to Spain and Sicily. The "Index Kewensis" and other works give it as a native of China. Forbes and Hemsley ("Index Florae Sinensis") state:—"*Datura Metel* and *D. ferox*, both widely spread plants, are recorded as occurring in China." We must leave it at that for the present.

HAIRY THORN APPLE (*Datura Metel*, Linn.).

A tall undershrub. Stems stout, much-branched, finely glandular-hairy. Leaves softly hairy, entire or toothed, often wavy edged. Flowers white, large, trumpet-shaped. Calyx tubular, glandular-hairy. Capsule, pubescent, globular, large (about 2 inches diameter), reflexed (nodding), prickly.

A native of Tropical America; a common weed of roadsides and waste-places about towns in Queensland.

A poisonous plant, like the preceding species.

Datura fastuosa is recorded as naturalised in Queensland; all the specimens I have seen so labelled, however, belong to *D. Metel*.

A native species (*Datura Leichhardtii*) is common in some Western and Northern localities.

Eradication.—Hand-pulling or hoeing up before the plants bear ripe fruit is about the only certain method of dealing with these weeds.

PLATE 3.—DATURA METEL.
"Hairy Thorn Apple."

A PLANT POISONOUS TO STOCK.

Dr. J. Shirley, Principal of the Teachers' Training College, Brisbane, in a letter to the Editor of the "Queensland Agricultural Journal," draws attention to a yellow-flowering climbing plant known locally as the Cape Ivy. It has no connection with the Ivy family, but is a climbing relation to the well-known English groundsel. Its true name is *Senecio latifolius*. At the present moment the Brisbane suburbs have their gardens gay with its coloured flowers. From the Presidential Address by Dr. R. Marloth, delivered at Cape Town on 30th May, 1914, and published at Cape Town by the Cape Chemical Society, Dr. Shirley quotes the following extract:—"*Senecio latifolius* (Molteno disease plant) contains two alkaloids—viz., senecifoline and senecifolidine. The alkaloids produce hepatic cirrhosis, and must be considered to be the cause of the deleterious action of the herb."

From the above it is seen that the plant is the cause of a stock disease, producing a fibrous condition of the liver, and a change to a yellowish colour, followed by atrophy and death.

The plant was brought from the Cape by members of contingents returning from the Boer War. "It is being planted widely all over Queensland," says Dr. Shirley, "and as its tiny fruits, usually regarded as seeds, are scattered like thistledown by the winds, we shall have it widely and firmly established."

It is to be hoped that those who have planted this pernicious weed will give heed to Dr. Shirley's timely warning, and promptly eradicate it.

[Mr. C. T. White, Acting Government Botanist, referring to this plant, says that "the Cape Ivy is not *Senecio latifolius*. The poison herb *S. latifolius* of South Africa is quite a distinct plant. I look upon the Cape Ivy as *S. tamoides*."—Ed. "Q.A.J."]

CROP ROTATION: EFFECT ON FERTILITY.

Some remarkable figures showing the importance of rotation (says the "Producers' Review") are given by Professor C. A. Gearhart, of the Ohio Experiment Station. In a twenty-year test with corn the following results were obtained, average yields per acre during the first years being compared with average yields during the fourth five-year period, and then the average for twenty years being given.

Average corn yield per acre in bushels:—

	First Five Years.	Fourth Five Years.	Average for Twenty Years.
Continuous—no manure ..	26·26 ..	8·44 ..	15·47
Rotation—no manure ..	31·89 ..	20·31 ..	28·95
Continuous—with manure ..	43·13 ..	30·22 ..	37·02
Rotation—with manure ..	40·73 ..	55·83 ..	51·81

Even with manure it will be seen the yields in fields continuously cultivated in corn decreased 13 bushels per acre (comparing the fourth five-year period with the first five-year period), while rotation with the manured fields increased the yields more than 15 bushels per acre.

Entomology.

THE CANE BEETLE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. Jarvis, the Entomologist:—

Grubs of the greyback cane beetle are now in the third stage, fully grown, and about to pupate.

Greenhills Plantation, near Gordonvale, is reported to be suffering severely this season, 300 acres or more being badly affected; and the pest is also doing great damage in the Highleigh and Aloomba districts.

Whilst ploughing cane land during April and May one frequently turns up numbers of small grubs about three-quarters of an inch long, which, occurring in association with third-stage *albohirta* 1¾ inches in length, are erroneously believed by most cane-farmers to be young larvæ of this species that have emerged from eggs laid during the present season, while they suppose the others to be full-sized grubs of our greyback cockchafer, but hatched the previous year. It may interest growers to learn that these small larvæ, in evidence just now, represent the second stage of *Lepidiota frenchi*, a destructive scarabæid beetle of a dark reddish-brown colour, and figured in Bulletin No. 3 of this Office ("Notes on Insects Damaging Sugar Cane in Queensland," p. 37, fig. 41). Its metamorphosis apparently occupies a period of two years, while the complete life-cycle of *albohirta* (from egg to perfect insect) takes only twelve months.

Although both beetles oviposit during December and January, the grubs of the latter species attain full growth in a space of about six months (January to June), pupating, as a rule, from July to September: whereas those of *frenchi*, which mature very slowly, remain in the larval stage for fully a year longer; thus accounting for the present occurrence in the same furrow or large and comparatively small grubs.

Owing to its two years' life-cycle, the second and third larval stages of *frenchi* are both procurable during winter months.

Fully-grown grubs of this insect are usually mistaken for those of *albohirta*, which they closely resemble in size and general appearance. As mentioned in a previous report, *Lepidiota frenchi*, although feeding habitually on roots of cereals and other herbaceous plants, has already acquired a liking for cane ("Australian Sugar Journal," Vol. VIII., p. 917).

A decided outbreak of this pest, which occurred recently at Meringa on red volcanic soil, was investigated on the 30th May, when 186 second-stage grubs were collected in a few hours from 50 chains of furrow, representing about 2,418 grubs per acre, or 0·85 to each stool of cane. Although one of our serious cane beetles, second perhaps to *albohirta* in economic importance, this insect fortunately oviposits, as a rule, in uncultivated soil that is densely covered by grass or weeds, &c. This being the case, it behoves growers to maintain, during December and January, a system of clean culture on areas devoted to cane, and more particularly on fallow land that may be reserved for the planting of an early crop. Both *Lepidiota frenchi* and *albohirta* lay their eggs during these months, and are strongly attracted by a luxuriant growth of vegetation between the rows, so that land in this condition is almost sure to become badly infested. The former insect (*frenchi*) usually oviposits freely in such fallow land, with the result that, when it is ploughed for the early crop in May or April, the grubs from these eggs, being about five months old and still small, are often overlooked or allowed to remain in the soil. As a matter of fact, however, these young larvæ have still about a year to pass before pupating, during which time they are capable of causing considerable injury; moreover, after such infested land has been planted and the weeds destroyed, they are necessarily obliged to subsist almost entirely on the roots of the cane.

QUEENSLAND SUGAR MILLS.

CRUSHING DATES.

The following crushing dates of Queensland Sugar Mills are in addition to those published in the June issue of the "Queensland Agricultural Journal":—

Moreton	10th July
Bingera	19th June
Fairymead	11th June
Goodwood	13th June
Palms	Middle of June
South Johnstone	Middle of June
Proserpine	Middle of June
Mount Bauple	20th June
Babinda	Started 26th May
Hambledon	17th June

General Notes.

COCOANUT BUTTER.

Owing to the high price of butter, we have had more than the usual inquiries as to how to make cocoanut butter. Everyone knows how to make cocoanut oil, but the making of cocoanut butter is quite a different process, and requires some skill. Cocoanut butter is being very largely used in the place of dairy butter in the United Kingdom and France, and before the war it was largely used in Germany. It can be used wherever dairy butter is used. Here is the process:—Grate or grind in a mill the meat of the nut as fine as it can be ground, and for the meat of each average nut add a pint of boiling water. Put this in a press, so that the milk can be squeezed out separate from the pulp. This milk can be used in place of cow's milk for any purpose, and is specially good with stewed fruit. To make butter, this milk can be separated in a separator or let stand in a pan to let the cream rise, which it should do in about the same time as the cream in cow's milk. This can be set to ripen, and be churned in the usual way. The whole process is in every respect the same as in making dairy butter. Wash out the butter-milk; add salt to taste. As a rule, this butter is white, and annatto colouring can be added. According to the size of the nuts, it should take from 6 to 10 nuts to make 1 lb. of butter. The churning should be done in a cool temperature, say between 60 to 70 degrees.—"Journal of the Jamaica Agricultural Society."

AN IMPORTANT CANADIAN INVENTION.

A correspondent of "The Watch Tower" (a Brooklyn, U.S.A., publication) gives the following account of a Canadian invention which he says bids fair to become of vast importance, especially to the farmer. Throughout Canada, the States, and all over the world are immense stacks of straw (many millions of them) which hitherto have been useless, and were burnt to get them out of the way. These are now to be very profitably utilised. A company has been organised in Moose Jaw, Canada, capitalised for the purpose of manufacturing this invention and selling it to the farmers. Briefly, the invention is this:—

The farmer can build a plant at a nominal cost, which will generate gas from the straw. This gas will light and heat the home, furnish power for the threshing machine, or any other machine needing power, or.

compressed in a tank similar to a Prestolite tank, will run the automobile at less expense by far than by present methods. Thirty minutes' work by a man, woman, or child will generate 1,000 feet of gas, which is stored in a tank for future use, and the most delicate instrument necessary is a pitchfork. This is not all. After the gas is driven off (by fire), the coke-like refuse is utilised, and the products made from a ton of straw, aside from the gas, are worth 15 dollars. These consist of tar, oils, and pitch; and, lastly, that which remains is pressed into briquettes of coal, either hard or soft, which make the very best of fuel. It costs about 1½ dollars a ton to make this coal. The installation expense is not high—a couple of ovens, a gas tank, a compressor for gas, one to compress the refuse into coal, and receptacles for the tar and coal.

The writer says he visited the demonstration room and saw all the processes.

RESISTANCE OF BUDDED COTTONS TO DISEASE.

Mr. Harland states in the Report of the Agricultural Department for St. Vincent, 1915-1916, that during the year a study was made of the resistance of budded cottons. The budding of cottons is a simple operation. A young plant about 2 feet high can be used as stock, the bud being inserted about 1 foot from the ground. Provided that the sap is flowing freely in both stock and scion, it is immaterial whether petioled or non-petioled budwood is used, or whether the stock and the branch from which the bud is taken are approximately of the same diameter or not.

The following conclusions are arrived at from a study of the behaviour of budded cottons:—

(1.) If the stock is susceptible and the scion immune, the scion retains its immunity completely.

(2.) If the stock is immune and the scion susceptible, budding apparently confers on the scion a certain degree of resistance.

(3.) If the stock is fairly resistant and the scion susceptible, the scion remains susceptible, though perhaps not so susceptible as when on its own roots.

(4.) If the stock is susceptible and the scion fairly resistant, the same degree of resistance is retained by the latter.—"Agricultural News," Barbados.

CO-OPERATIVE PLOUGHING.

Last year a co-operative society was formed in France for machine ploughing. The society is composed of eight members, who farm between them about 578 acres. The fields are situated close to each other, and are from 25 to 62 acres each, and on flat or slightly undulating ground, thus being in all respects favourably situated for ploughing machines. About one-third of the acreage is heavy clay, the rest is loam. The

co-operative society uses a 25-horse power tractor and a three-furrow plough. The tractor cost about £525, and the plough £56; the expense is borne by eight members in proportion to the areas to be ploughed. The statutes of the society are copied from the model drawn up by the Ministry of Agriculture. The yearly subscription of each member is 16s., and the supplementary contributions may not exceed £4. The expenses of all kinds will be divided every month *pro rata* of the acreage ploughed during the time. The order of succession in which the members are to use the outfit is settled by drawing lots, and when the machine has been round once the order will be reversed. A preference, however, is given to the heavier land, which is to be ploughed during fine weather. The society has been granted a subvention of about £160 by the Ministry of Agriculture.—"Producers' Review."

A PROFITABLE RHODES GRASS CROP.

Rhodes Grass as a forage crop appears to be driving Paspalum into the background. Since it was first introduced it has made rapid progress in the estimation of dairy farmers and agriculturists generally as a splendid fodder for stock. The accompanying illustration shows portion of a fine field of 30 acres growing on Mr. H. A. Flynn's farm at Narko,

PLATE 4.—A PROFITABLE RHODES GRASS CROP.

on the Cooyar railway line, about 40 miles from Toowoomba, which has been cut twice during the season. The grass averages 5 feet 6 inches in height, and the whole of the seed has been sold to a firm of seedsmen in Brisbane. For the past six years Mr. Flynn has regularly harvested the seed.

SOCIETIES, SHOW DATES, ETC.

Dalby.—Dalby Pastoral and Agricultural Society.—The show dates have been changed from 1st and 2nd August to 3rd and 4th October.

Deeford.—Alma Creek Branch of the Queensland Farmers' Union. J. Erickson, hon. secretary.

Kilcoy.—Kilcoy Pastoral, Agricultural, and Industrial Society. Show dates, 12th and 13th July.

Palmwoods.—Palmwoods Progress and Fruit Growers' Association. Norman Cope, secretary.

Tara.—Gums and South Glen Branch of the Queensland Farmers' Union. R. F. Morkham, secretary.

Waverley.—Wondalli Branch of the Queensland Farmers' Union, *viâ* Yelarbon. C. H. Cameron, secretary.

Answers to Correspondents.

TO ASCERTAIN THE AREA OF A FIGURE WITH FOUR SIDES OF UNEQUAL LENGTH WITHOUT OBTAINING A DIAGONAL.

"ENGINEER"—

This can only be ascertained by a trigonometrical formula which is somewhat difficult to understand without mathematical knowledge. If one angle of the figure is a right angle, then the solution is easy, because the hypothenuse can be found by adding together the squares of the base and perpendicular, and finding the square root of sum. This will then divide the figure (which may be a trapezium or a trapezoid) into two triangles, the area of each of which can be found by the rule given in this Journal for January, 1915,* inasmuch as the hypothenuse will be the third side of each triangle. If all angles are obtuse or acute, the only way is to find the sine by the use of instruments, and from that calculate the length of a diagonal, when the calculation is easy by dividing into triangles.

Example.—$19 + 15 + 14 = \frac{48}{2} = 24 - 19 = 5$

$24 - 15 = 9$

$24 - 14 = 10$

$24 \times 5 = 120 \times 9 = 1080 \times 10 = 10800$, the square root of which is 10·40 acres.

* To obtain the area of a block in triangular form with sides, say, 14, 15, and 19 chains respectively, add the three sides together, and take half the sum. Then multiply the half sum and the three remainders together. The square root of the last product will give the area.

TREATMENT FOR WORMS IN A FOAL.

F. E. DEDUHN, Hillside, Rosewood—

Your letter relative to an affection from which a foal is suffering was referred to the Veterinary Department, and Veterinary Surgeon Speer reports as follows:—

"As the foal is only six months old, I am strongly against drenching, as it is somewhat risky. The worm is probably *Ascaris megalocephalus*, and, except for sometimes causing attacks of colic, I do not think is very harmful. I should advise the following:—

Saccharated carbonate of iron, 15 grains; sulphate of iron, 15 grains. Make one powder.

Give one powder night and morning in damp food for 14 days; also, add a ration of coarse salt to the feed. These powders are practically tasteless, and there should be no difficulty in getting the foal to eat them. A dose of castor oil before starting the powders and a dose to clear the foal out when they are finished are advisable."

THE McMASTER PATENT MOTOR GATE.

INTERESTED, Dalby—

This gate is made in two sections each 12 feet long by 8 feet wide. The sides are of angle steel hinged to the entrance posts. The battens, as shown in photo, are 6 inches by 1½ inches hardwood bolted to the angle steel sides with an extra support of a 4-inch by 1½-inch batten in centre, bolted to battens on the rising and falling end of the gate. A

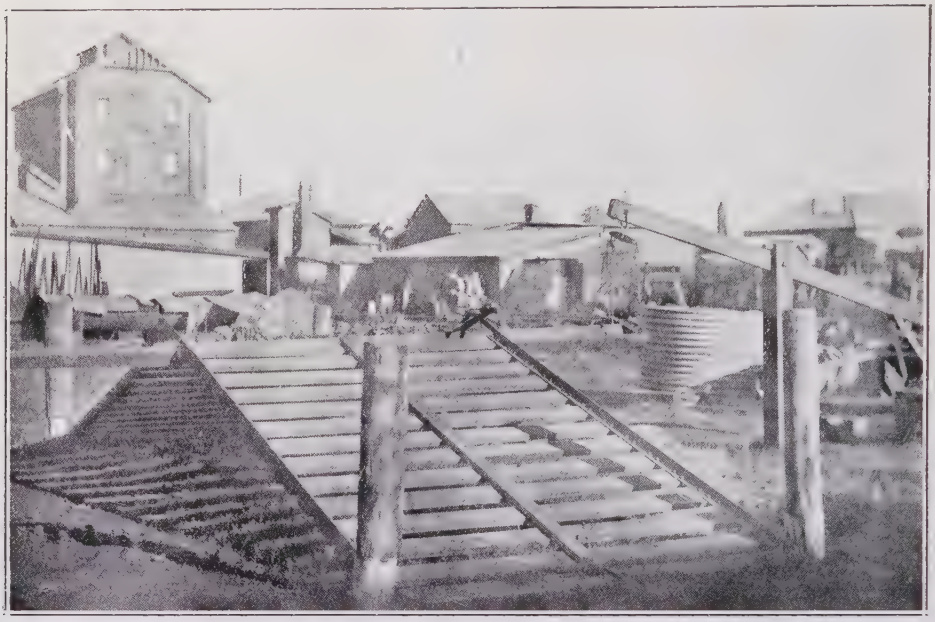

PLATE 5.—THE McMASTER PATENT MOTOR GATE.

5-inch by 3-inch hardwood stringer is bolted to the angle frame. These stringers are attached to a rocking beam with eye-bolts and chains. There are two beams, 6 inches by 3 inches hardwood, 12 feet long, hinged in centre through a hardwood post, 7 inches by 7 inches. On the opposite end of each beam is a balance box of 1½ inches hardwood strongly made and secured to beam by wrought-steel plates. These boxes are of sufficient capacity to hold soil or gravel to balance the gate. The agents consider this an improvement to the gate erected on the Winton road. There is less friction with the beam than with a rope running over pulleys, and you can also balance the gate better than with cast-iron weights, and at less cost.

The agents for the gate are Messrs. Burns and Twigg, engineers, Rockhampton, who supply gate complete, also plan for erection of same, for £20 f.o. truck or steamer, Rockhampton. Shipping weight, 28 cwt.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JUNE, 1917.

Article.		JUNE. Prices.
Bacon	lb.	9d. to 1s.
Barley (Cape)	bush.	2s. to 2s. 6d.
Barley (Spineless)	"	3s. 9d. to 5s. 6d.
Bran	ton	£5 15s.
Broom Millet	"	£19 to £24
Butter (1st grade)	cwt.	158s. 8d.
Chaff, Mixed	ton	£3 10s. to £6
Chaff, Oaten	"	£5 to £5 10s.
Chaff, Lucerne	"	£4 to £5 10s.
Chaff, Wheaten	"	£2 10s.
Cheese	lb.	9d. to 9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	...
Hay, Lucerne	"	£2 10s. to £3 10s.
Honey	lb.	5d. to 5½d.
Maize	bush.	2s. 7½d. to 2s. 8½d.
Oats	"	1s. 6d. to 2s. 6d.
Onions	ton	£7 to £8
Peanuts	lb.	3d. to 4½d.
Pollard	ton	£7 2s. 6d.
Potatoes	"	£5 15s. to £6 10s.
Potatoes (Sweet)	sug. bag	1s. to 1s. 6d.
Pumpkins (Cattle)	ton	£2 to £2 5s.
Eggs	doz.	1s. 7d. to 2s.
Fowls	per pair	3s. to 4s. 6d.
Ducks, English	"	3s. 6d. to 3s. 9d.
Ducks, Muscovy	"	4s. to 5s.
Ducks (Wild)	"	3s. 6d.
Geese	"	6s. to 7s.
Turkeys (Hens)	"	7s. to 8s.
Turkeys (Gobblers)	"	13s. to 15s.
Wheat (Milling)	bush.	4s.
Hares (alive)	per pair	15s.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per bundle	...
Cabbages, per dozen	2s. 6d. to 7s.
Cauliflowers, per dozen	3s. to 10s.
Celery, per bundle	...
Cucumbers, per dozen	2s. to 3s. 6d.
Beans, per sugar bag	5s. to 7s.
Peas, per sugar bag	6s. to 10s. 6d.
Carrots, per dozen bunches	10d. to 1s.
Chocos, per quarter-case	2s. to 2s. 2d.
Beetroot, per dozen bunches	8d. to 9d.
Marrows, per dozen	1s. 6d. to 4s.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per sugar bag	1s. to 1s. 6d.
Table Pumpkins, per dozen	1s. 9d. to 3s.
Tomatoes, per quarter-case	1s. to 4s.
Turnips, per dozen bunches	10d. to 1s.
Rhubarb, per dozen bundles	

SOUTHERN FRUIT MARKETS.

Article.	JUNE. Prices.
Bananas (Queensland), per case	6s. to 12s.
Bananas (Fiji), per case	14s. 6d. to 16s. 6d.
Bananas (G.M.), per case	16s. 6d. to 18s.
Custard Apples, per tray	5s. to 7s.
Lemons (Local), per bushel-case	...
Mandarins, per bushel-case	6s. to 7s.
Oranges (Navel), per case	6s. to 10s.
Oranges (other), per case	6s. 6d. to 7s. 6d.
Papaw Apples, per half-bushel-case	8s. to 9s.
Passion Fruit, per half-case	1s. 6d. to 6s. 6d.
Persimmons, per half-case	1s. 6d. to 3s. 6d.
Pineapples (Queens), per double-case	10s. to 12s.
Pineapples (Ripleys), per double-case	8s. to 10s.
Pineapples (Common), per double-case	7s. 1d. to 9s. 1d.
Tomatoes, per half-bushel-case	6s. to 8s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JUNE. Prices.
Apples, Eating, per case	9s. 6d. to 11s.
Apples, Cooking, per case	9s. to 10s.
Bananas (Cavendish), per dozen	1d. to 3½d.
Bananas (Sugar), per dozen	2d. to 3d.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	3s. to 3s. 6d.
Custard Apples, per tray	3s. to 3s. 6d.
Granadillas, per quarter-case	...
Grapes, per lb.	...
Lemons (Lisbon), per quarter-case	3s. 6d. to 4s. 6d.
Limes, per quarter-case	3s. to 4s. 6d.
Mandarins, per quarter-case	3s. to 5s. 6d.
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	2s. 6d. to 3s.
Oranges (Seville), per hundredweight	11s.
Papaw Apples, per case	1s. 6d. to 3s.
Passion Fruit, per quarter-case	3s. 6d. to 4s. 6d.
Pears, per quarter-case	8s. to 10s.
Peanuts, per lb.	3d. to 4½d.
Persimmons, per quarter-case	4s. to 5s.
Pineapples (Ripleys), per dozen	5s. to 8s.
Pineapples (Rough), per dozen	9d. to 2s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s.
Pomeloes, per hundredweight	9s. to 10s.
Quinces, per quarter-case	3s.
Rosellas, per sugar bag	3s. 6d. to 4s.
Strawberries, per dozen boxes	6s. to 12s. 3d.
Tomatoes, per quarter-case	1s. 6d. to 3s. 9d.

TOP PRICES, ENOGGERA YARDS, MAY, 1917.

Animal.	MAY. Prices.
Bullocks	£18 5s. to £22 12s. 6d.
Cows	£12 15s. to £13 15s.
Merino Wethers	39s. 6d.
Crossbred Wethers	45s. 3d.
Merino Ewes	33s.
Crossbred Ewes	44s.
Lambs	33s.
Pigs (Porkers)	50s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MAY, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall. May.	Average Rainfall. No. of Years' Records.	Total Rainfall. May, 1917.	Total Rainfall. May, 1916.
North Coast.				
	In.		In.	In.
Atherton	2·05	15	3·26	2·08
Cairns	4·58	34	2·39	3·60
Cardwell	3·65	44	3·56	1·72
Cooktown	2·95	40	1·47	4·67
Herberton	1·57	29	3·83	1·69
Ingham	3·53	24	3·75	1·97
Innisfail	12·46	35	17·49	7·01
Mossman	3·52	4	4·70	3·39
Townsville	1·39	45	2·40	0·60
Central Coast.				
Ayr	1·16	29	2·66	0·89
Bowen	1·39	45	1·51	1·31
Charters Towers ...	0·80	34	1·35	0·73
Mackay	3·96	45	1·65	3·19
Proserpine	5·58	13	2·39	5·28
St. Lawrence ...	1·92	45	1·01	0·62
South Coast.				
Biggenden	2·06	17	0·92	2·42
Bundaberg	2·85	33	1·84	1·45
Brisbane	2·91	66	0·48	1·00
Childers	2·42	21	1·69	3·64
Crohamhurst ...	5·00	25	2·47	2·20
Esk	2·25	29	0·25	0·91
Gayndah	1·67	45	1·09	0·54
Gympie	3·16	46	1·61	1·75
Glasshouse M'tains	3·68	8	2·18	1·60
Kilkivan	2·09	37	0·77	0·91
Maryborough ...	3·07	45	2·54	5·76

Divisions and Stations.	Average Rainfall. May.	Average Rainfall. No. of Years' Records.	Total Rainfall. May, 1917.	Total Rainfall. May, 1916.
South Coast—continued:	In.		In.	In.
Nambour	5·03	20	3·60	3·84
Nanango	1·72	34	0·46	0·96
Rockhampton ...	1·61	29	1·09	0·14
Woodford	3·03	29	0·66	1·52
Darling Downs.				
Dalby	1·39	46	0·03	0·80
Emu Vale	1·28	20	0·11	0·79
Jimbour	1·35	28	Nil	0·49
Miles	1·77	31	0·06	0·13
Stanthorpe ...	2·05	43	0·15	0·94
Toowoomba ...	2·43	44	0·37	0·45
Warwick	1·77	29	Nil	0·45
Maranoa.				
Roma	1·64	42	Nil	Nil
State Farms, &c.				
Bungeworgorai ...	0·65	4	0·02	Nil
Gatton College ...	2·07	17	0·15	0·30
Gindie	1·21	17	0·10	Nil
Hermitage ...	1·48	10	0·02	0·76
Kairi	1·69	4	2·95	1·34
Kamerunga ...	4·41	28	2·55	3·31
Sugar Experiment Station, Mackay	3·76	19	2·99	2·91
Warren	0·37	4	0·17	0·06

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for May this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON.

1917.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·32	4·59	6·40	5·4	6·30	5·18
2	6·13	5·16	6·32	4·59	6·40	5·4	6·30	5·18
3	6·14	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6·15	5·14	6·33	4·59	6·40	5·5	6·29	5·19
5	6·15	5·14	6·33	4 59	6·40	5·5	6·28	5·20
6	6·16	5·13	6·34	4·59	6·40	5·5	6·28	5·20
7	6·15	5·12	6·34	4·59	6·40	5·6	6·27	5·21
8	6·17	5·12	6·34	4·59	6·40	5·6	6·26	5·21
9	6·17	5·11	6·35	4 59	6·40	5·6	6 25	5 22
10	6·18	5·11	6·35	4·59	6 39	5·7	6·24	5·22
11	6·19	5·10	6·35	5 0	6·39	5·7	6·23	5·23
12	6·20	5·9	6·36	5·0	6·39	5·8	6 22	5·23
13	6·21	5·9	6·36	5·0	6·39	5·8	6 21	5 24
14	6·21	5·8	6·36	5·0	6 39	5·9	6·20	5·24
15	6·22	5·8	6·36	5 0	6·38	5·9	6·19	5·25
16	6·23	5·7	6·37	5·0	6·38	5·10	6·18	5·25
17	6·23	5·7	6·37	5·0	6·38	5·10	6·17	5·26
18	6·24	5·6	6·37	5·0	6·37	5·11	6·16	5·27
19	6·24	5·6	6·37	5·0	6 37	5·11	6·15	5·27
20	6·25	5·5	6·38	5·0	6·36	5·12	6·14	5·28
21	6·25	5·5	6·38	5·1	6 36	5·12	6·13	5·28
22	6·26	5·4	6·38	5·1	6·35	5·13	6 12	5·29
23	6·27	5·3	6·38	5·1	6·35	5·13	6·11	5·29
24	6·27	5·3	6·38	5·1	6·34	5·14	6·10	5·30
25	6·28	5·2	6·39	5·2	6 34	5·14	6·9	5·30
26	6·29	5·2	6·39	5·2	6·33	5·15	6·8	5·31
27	6·29	5·1	6·39	5·2	6·33	5·15	6·7	5·31
28	6·30	5·1	6·39	5·3	6·32	5·16	6·6	5·32
29	6·30	5·0	6·39	5·3	6 32	5·16	6·5	5·32
30	6·31	5·0	6·39	5·3	6·31	5·17	6·4	5·33
31	6 31	4·59	...	...	6·31	5·17	6·3	6·33

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
7 May	○	Full Moon	12	43	p.m.
14 „	☽	Last Quarter	11	48	a.m.
21 „	●	New Moon	10	47	„
29 „	☾	First Quarter	9	33	„

The Moon will be nearest the earth on the 14th, and at its farthest distance on the 28th.

5 June	○	Full Moon	11	7	p.m.
12 „	☽	Last Quarter	4	38	„
19 „	●	New Moon	11	2	„
28 „	☾	First Quarter	2	8	a.m.

The Moon will be nearest the earth on the 9th, and at its farthest distance on the 25th. It will cause a partial Eclipse of the Sun on the 19th, visible in the Arctic Regions but not in Australia.

5 July	○	Full Moon	7	40	a.m.
11 „	☽	Last Quarter	10	12	p.m.
19 „	●	New Moon	1	0	„
27 „	☾	First Quarter	4	40	„

The moon will be nearest the earth on the 7th, and at its greatest distance on the 22nd. There will be a *Total Eclipse* of the *Moon* from 6·51 to 8·27 a.m. on the 5th; but only the moon's entrance into the shadow of the earth will be seen in Eastern Australia.

3 Aug.	○	Full Moon	3	11	p.m.
10 „	☽	Last Quarter	5	56	a.m.
18 „	●	New Moon	4	21	„
26 „	☾	First Quarter	5	8	„

The moon will be nearest the earth on the 4th, and at its greatest distance on the 18th.

* For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, and July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

se notes will not again be published until September, as they apply to the series from May to August.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, sisal hemp, cotton, and sugar-cane may now be planted. Sow maize for an early crop. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to fine art.

In choosing maize for seed, select the large, well-filled, flat grains. It has been shown that, by constantly selecting seed from prolific plants, as many as five and six cobs of maize can be produced on each stalk all over a field. A change of seed from another district is also beneficial. Sow pumpkins, either amongst the maize or separately, if you have the ground to spare. Swede turnips, clover, and lucerne may be sown, but they will have to contend with weeds, which will begin to vigorously assert themselves as the weather gets warmer; therefore, keep the hoe and cultivator constantly going in fine weather. Tobacco may be sown during this month. If vines are available, sweet potatoes may be planted towards the end of the month. In this case also it is advisable to avoid too frequent planting of cuttings from the old vines; and to obtain cuttings from other districts. If grasses have not yet been sown, there is still time to do so, if the work be taken in hand at once. Sugar-cane crushing will now be in full swing, and all frosted cane in the Southern district should be put through the rollers first. Plough out old canes, and get the land in order for replanting. Worn-out sugar lands in the Central and Northern districts, if not intended to be manured and replanted, will bear excellent crops of sisal hemp. Rice and coffee should already have been harvested in the North. The picking of Liberian coffee, however, only begins this month. Collect divi-divi pods. Orange-trees will be in blossom, and coffee-trees in bloom for the second time. As this is generally a dry month in the North, little can be done in the way of planting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown, which will keep the market gardeners busy for some time: Carrots, parsnips, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie

in the rough for a month before replanting, so that the soil may get the benefit of the sun and air. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look them over occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. It must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall was 2·63 inches, and for September 2·07 inches, increasing gradually to a rainfall of 7·69 inches in February.

Orchard Notes for August.

THE SOUTHERN COAST DISTRICTS.

The remarks that have appeared in these notes during the last few months respecting the handling and marketing of citrus fruits apply equally to the present month. The bulk of the fruit, with the exception of the latest ripening varieties in the latest districts, is now fully ripe, and should be marketed as soon as possible, so that the orchards can be got into thorough order for the spring growth. All heavy pruning should be completed previous to the rise in the sap; and where winter spraying is required, and has not yet been carried out, no time should be lost in giving the trunks, main branches, and inside of the trees generally a thorough dressing with the lime and sulphur wash.

Where there are inferior sorts of seedling citrus trees growing, it is advisable to head same hard back, leaving only the main trunk and four or five well-balanced main branches cut off at about 2 ft. from the trunk. When cut back, give a good dressing with the lime and sulphur wash. Trees so treated may either be grafted with good varieties towards the end of the month or early in September; or, if wished, they may be allowed to throw out a number of shoots, which should

be thinned out to form a well-balanced head, and when large enough should be budded with the desired variety.

Grafting of young stock in nursery, not only citrus but most kinds of deciduous fruits, can be done this month. It comes in useful in the case of stocks that have missed in budding, but for good, clean grown stocks budding is to be preferred.

In the case of working our Seville orange stocks to sweet oranges, grafting is, however, preferable to budding, as the latter method of propagation is frequently a failure. The Seville stock should be cut off at or a little below the surface of the ground. If of small size, a single tongue graft will be sufficient; but if of large size, then the best method is the side graft—two or more grafts being placed in each stock, so as to be certain of one taking. In either case the grafts are tied firmly in place, and the soil should be brought round the graft as high as the top bud. If this is done, there will be few missed, and undesirable Seville stocks can be converted into sweet oranges.

In selecting wood for grafting, take that of the last season's growth that has good full buds and that is well matured; avoid extra strong or any poor growths.

Seville oranges make good stocks for lemons. In case it is desirable to work them on to lemons, it is not necessary to graft below ground, as in the case of the sweet orange, but the stock can be treated in the same manner as that recommended in the case of inferior oranges—viz., to head hard back, and bud on the young shoots.

Where orchards have not already been so treated, they should now be ploughed so as to break up the crust that has been formed on the surface during the gathering of the crop, and to bury all weeds and trash. When ploughed, do not let the soil remain in a rough, lumpy condition, but get it into a fine tilth, so that it is in a good condition to retain moisture for the trees' use during spring. This is a very important matter, as spring is our most trying time, and the failure to conserve moisture then means a failure in the fruit crop to a greater or less extent.

Where necessary, quickly acting manures can be applied now. In the case of orchards, they should be distributed broadcast over the land, and be harrowed or cultivated in; but in the case of pines they should be placed on each side of the row, and be worked well into the soil.

The marketing of pines, especially smooths, will occupy growers' attention, and where it is proposed to extend the plantations the ground should be got ready, so as to have it in the best possible condition for planting, as the thorough preparation of the land prior to planting pines is money very well spent.

The pruning of all grape vines should be completed, and new plantings can be made towards the end of the month. Obtain well-matured, healthy cuttings, and plant them in well and deeply worked land, leaving the top bud level with the surface of the ground, instead of leaving 6 or 7 in. of the cutting out of the ground to dry out, as is often done. You only want one strong shoot from your cutting, and

from this one shoot you can make any shaped vine you want. Just as the buds of the vines begin to swell, but before they burst, all varieties that are subject to black spot should be dressed with the sulphuric acid solution—viz., three-quarters of a pint of commercial sulphuric acid to one gallon of water; or, if preferred, this mixture can be used instead —viz., dissolve 5 lb. of sulphate of iron (pure copperas) in one gallon of water, and when dissolved add to it half a pint of sulphuric acid.

THE TROPICAL COAST DISTRICTS.

Bananas should be increasing in quality and quantity during the month, and though, as a rule, the fruit fly is not very bad at this time of the year, still it is advisable to take every care to keep it in check. No over-ripe fruit should be allowed to lie about in the gardens, and every care should be taken to keep the pest in check when there are only a few to deal with, as, if this is done, it will reduce the numbers of the pest materially later on in the season. The spring crop of oranges and mandarins will be now ready for marketing in the Cardwell, Tully, Cairns, and Port Douglas districts. For shipping South see that the fruit is thoroughly sweated, as unless the moisture is got rid of out of the skins the fruit will not carry. Should the skins be very full of moisture, then it will be advisable to lay the fruit on boards or slabs in the sun to dry; or, if this is not possible, then the skin of the fruit should be artificially dried by placing same in a hot chamber, as the moisture that is in the skin of our Northern-grown citrus fruits must be got rid of before they will carry properly.

Papaws and granadillas should be shipped South, and the markets tested. If carefully packed in cases holding only one layer of fruit, and sent by cold storage, these fruits should reach their destination in good order. Cucumber and tomato shipments will be in full swing from Bowen. Take care to send nothing but the best fruit, and don't pack the tomatoes in too big cases, as tomatoes always sell on their appearance and quality.

THE SOUTHERN AND CENTRAL TABLELANDS.

All fruit-tree pruning should be finished during the month, and all trees should receive their winter spraying of the lime and sulphur wash.

All new planting should be completed, orchards should be ploughed and worked down fine, and everything got ready for spring.

In the warmer parts, grape pruning should be completed, and the vines should receive the winter dressing for black spot. In the Stanthorpe district grape pruning should be delayed as late as possible, so as to keep the vines back, as it is not early but late grapes that are wanted, and the later you can keep your vines back the better chance they have of escaping spring frosts.

Towards the end of the month inferior varieties of apples, pears, plums, &c., should be worked out with more desirable kinds; side, tongue, or cleft grafting being used. In the case of peaches, almonds, or nectarines, head back and work out by budding on the young growth.

QUEENSLAND COTTON PRODUCTION IN 1916.

The total quantity of raw cotton dealt with at the State Ginnery in 1916 by the Department of Agriculture and Stock on growers' account was 29,230 lb., from which was obtained 10,066 lb. of prime lint, 18,284 lb. seed, and 880 lb. second-class lint. The number of pounds of seed cotton required to produce 1 lb. of lint was 2·90 lb., and for 1 lb. of seed 1·6 lb. of seed cotton. The percentage of lint to raw cotton was 34·4, and 1 lb. of raw cotton produced ·344 lb. of lint. The lint was sold locally, ex Store, at 6·9d. per lb., the best lint bringing 7d. per lb. The seed was purchased by the Department for redistribution to farmers for planting during 1917. After deducting ginning expenses, the growers received a net return of 2/54d. per lb. for their seed cotton, which at the average of 1,000 lb. of seed cotton per acre was equal to a gross return of £10 11s. 8d. per acre. Deducting the expenses of raising and picking a 1,000-lb. crop, the net return was £7 14s. 9d. per acre. The picking cost averaged £2 1s. 8d. per acre, and where the grower kept the cost of picking in his own family, he saved this cash outlay.

How does this compare with maize-growing? A 40-bushel crop at 2s. 3d. per bushel in a good season gives a net profit of £2 18s. 4d. per acre. Of all our ordinary farm crops, rice is the only one which can compete in value with cotton. An acre of rice producing 30 bushels is worth £6 for grain (probably more in these war times) and the same for the straw. It costs over £3 to produce an acre of rice, the net profit being £8 16s. 3d. The net profit on wheat on the same basis and including straw is about £2 16s. when wheat is selling at 3s. per bushel. On barley it is about £3, and on maize, with a 30-bushel crop, £2 3s. And over all these crops, cotton presents the additional advantage of less labour in harvesting, and in keeping qualities owing to its freedom from weevils or other troublesome insects.

THE FUTURE DEMAND FOR COTTON.

With regard to the future demand for cotton, it must be remembered that of the world's population of 1,500,000,000, about 500,000,000 regularly wear clothes; about 750,000,000 are partially clothed, and 250,000,000 go quite naked, with, in many tropical countries, the small addition of a cotton loin-cloth. Now to clothe the entire population of the world would require 42,000,000 bales of 500 lb. each annually. It is highly improbable that the supply of cotton will ever exceed the demand, and we have to-day evidence that, owing to the war, and the great demand for cotton for explosives, the supply of cotton is very considerably below requirements. There is a sensible diminution in the United States of America, owing to a bad season and the ravages of the boll weevil,

amounting to a fall from 15,000,000 to 13,000,000 bales, with the result that the price of cotton has risen from 7d. per lb. to 16d. per lb. A year or two after the American Civil War, during which 14,000 acres were under cotton in Queensland, bringing 3d. per lb. for seed cotton and 1s. to 1s. 2d. per lb. in the Liverpool market, it was found that cotton was the most payable crop the farmer could grow, even had the price of cotton fallen to 8d. or 9d. per lb. in the home markets. Unfortunately for the industry in Queensland, American cotton fell as low as 4½d. per lb., and the result was that at that price cotton growing anywhere except in a black labour or slave country became out of the question.

To-day, however, with cotton likely to remain at a high price during and after the war, those who are wavering in their ideas concerning the future of cotton—that is to say, who are in doubt whether prices will keep up or whether there will be such an over-supply that prices will recede to a non-paying point—may take heart of grace and plant with good prospects before them.

The Department of Agriculture and Stock advances 1¾d. on all cotton sent to the State ginning establishment, William street, Brisbane, and all profit derived from the sale, less actual expenses, will be paid to the growers.

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